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7931 - 89 Ave
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POTENTIALS FOR COWDOMINIUM DAIRY PRODUCTION

by

Ⓒ DENNIS J. PRINCE

A THESIS

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The undersigned certify that they have read and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Potentials for Cowdominium Dairy Production," submitted by Dennis J. Prince in partial fulfilment of the requirements for the degree of Master of Science.

Supervisor

Michele Veeman

Date 3 October 1974

R. S. Patterson

ABSTRACT

Dairy farming in Canada and Alberta has been a significant portion of total agriculture since the turn of the century. The relative stability of the milk and cream markets has enabled many dairy farmers to survive, who otherwise would have been forced out of farming. In the past decade advancing technology, labor problems and general attrition has resulted in a rapidly declining dairy industry in Alberta in terms of both numbers of farmers and total milk production.

Current Federal and Provincial agriculture policy is to 'Preserve the Family Farm' within a viable agriculture industry. This study explores an alternative for the marginal dairy farmer within the present policies of Government.

Feasibility studies confirm the feasibility of 1,000-cow dairy operations in Alberta if qualification for Canadian Dairy Commission subsidy is attained. Without this qualification the large dairy complexes are not feasible. The existence of such units in Utah and Arizona lends a reality to an otherwise theoretical model.

The principal advantages of the larger dairy cow complexes are:

1. The economies of scale.
2. The improved management.
3. The gains from specialization.

The marginal dairy farmers who choose to become involved in a Cowdominium co-operative will enjoy increased return for their

labor and increased capital gain on their investment.

The sociological implications of marginal farmers going co-operative are a major factor in the Cowdominium potential. The reactions of farmers to the concept are varied. The commercial farmers' reaction is positive; the marginal farmer, in general, is skeptical.

The results of this study are that large dairy complexes are feasible in Alberta and that two or three of them should be established in selected areas of the Province.

After a period of five years, the information gained from the operation of the initial projects should be useful in establishment of future policy relative to the Cowdominiums in Alberta.

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I am indebted to many people for assistance given in the preparation of this study. My supervisor, Dr. P. Apedaile, Professor of Agricultural Economics, University of Alberta, has provided encouragement and sensitive direction throughout the entire time. Dr. Apedaile is an outstanding teacher. My wife Ellen, and our family of Joanne, Beverly, Mary Ellen, Sharon, Shauna, and Dennis Scott; and our married children Gregory, Janis, Bruce, Jim and their companions have been very kind and understanding in their support of my effort.

Relevance has been of major concern in this work, so it is with some satisfaction that this thesis is produced coincident with Cowdominiums coming into being in Alberta. This timeliness was made possible by the combined efforts of many, including typists Wendy Preston and my daughter Janis Butler; Evelyn Shapka and Ron Bence of the Department of Agricultural Economics, University of Alberta, and staff of the Alberta Department of Agriculture including economists Lorne Owen and Marvin Galts. Special mention must go to Cleon Kotter, Agriculture Information Specialist, Department of Extension, Utah State University at Logan, Utah; and the Utah State University Dairy Team who were so generous with their time, experience and information with respect to Cowdominiums.

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CHAPTER I

INTRODUCTION

The number of farms in Alberta and Canada has been decreasing during the past ten years. In 1961 there were 481,000 census farms in Canada.[1] This number declined to 431,000 in 1966, 382,000 in 1971, and it is projected that by 1980, if present trends continue, there will be only 350,000 farms in Canada.[2] During the 1961-70 decade there was a decline in the number of farms from 309,000 to 145,000[3] reporting milk cows.[4] This is evidence of a degree of specialization in the milk production industry, since total pounds of milk produced during that period remained fairly stable.[5] Average annual milk production per cow in Canada increased from 6,740 pounds to 7,680 pounds during the 1967-73 time period, and the number of dairy cows in Canada decreased from 2.7 million in 1967 to 2.2 million in 1973.[6]

---

[1] Statistics Canada, 1971 Census of Agriculture (Ottawa: Statistics Canada, 1971).

[2] Ibid.

[3] Ibid.

[4] This seemingly drastic reduction in dairy farmers during this period of time should not be misinterpreted. Many of the farmers involved would have dairy cows producing only enough milk for their domestic needs. The disappearance of the dairy cow from these farms may be seen as an indication of increasing affluence, and not significant in terms of the dairy industry.

[5] Statistics Canada, Dairy Statistics, Cat. No. 23-201 (Ottawa: Statistics Canada, Table 1).

[6] Ibid.

The situation in Alberta is similar to that of Canada. The number of milk cows decreased from 235,000 in 1967 to 169,000 in 1973 and total milk produced dropped from 1.6 billion pounds in 1967 to 1.4 billion pounds in 1973.[7] The increase in average annual milk production per cow in Alberta from 1967 to 1973 was from 6,800 pounds to 8,280 pounds.

Extrapolation of past trends may be very misleading, since the rate of change varies over time. Some indicator is needed to determine the direction in which past trends are tending to be inclined in the present time frame, in order to be able to estimate future expectations. An examination of statistical information (Appendices A, B, and C) indicates that:

1. Total milk production in Canada has remained relatively constant from 1962-1972 (Appendix A);

2. Total milk used in manufacturing in factories has remained relatively constant during the same time period (Appendix A);

3. Fluid milk sales have increased significantly, this being a reflection of the shift of population from farm to urban centers (Appendix A);

4. Milk used on farms for manufacturing, consumption and animal feeding declined drastically (Appendix A);

5. An increase within the manufacturing sector of milk used for cheese and concentrated milk products (Appendix B); and

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[7] Alberta Department of Agriculture, Annual Report (Edmonton: ADA, 1973).

6. Utilization of milk in Alberta is significantly different from that of Canada (Appendix C).

An important change in the dairy industry in the past decade has been the conversion of farm separated cream shippers to fluid and manufacturing milk shippers. Appendix D illustrates this change.

From the foregoing statistical evidence it is apparent that the maintainance of fluid milk production and the increase in manufacturing milk production has been accomplished by the conversion of farm separated cream producers to milk producers. This has occurred mainly as producers changed their operations from milk and cream cans to farm bulk tanks. There was an increase in the number of farm bulk tanks in Alberta from 866 in 1962 to 1650 in 1973.

Useful information at this point would be the intentions of the remaining 12,000 cream producers in Alberta relative to their future production plans. The cream producer has, through conversion to milk production, been able to maintain and even increase the production of fluid and manufacturing milk in Alberta. Many of these cream producers cease production entirely, however, and it is the increase in the size of the production units of those who convert to bulk milk which has resulted in relatively stable total milk production.

A survey was taken in 1973 of the farm separated cream producers in the Wetaskiwin, Camrose and Viking areas of Alberta.[8] A total of 470 farmers were included, and a 75 percent response was realized.

The conclusion drawn from the survey was that significant increases in milk production in the future cannot be expected to come from cream producers converting to bulk milk. In fact, with the numbers of fluid and manufacturing milk producers who left the industry in the past year, it is doubtful whether converted cream shippers will be able to provide the buffering effect on the total industry which they have provided in the past ten years.

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[8] See Appendix E.

A further indicator of the current trend in the dairy industry in Alberta is the 19 percent decrease in milk production recorded in the April 1 - July 1, 1974 period compared to April 1 - July 1, 1973 period.[9] Also a 24 percent decrease was recorded in butterfat received as cream by creameries in Alberta from December 31, 1973 - August 24, 1974 compared to the January 1 - August 25, 1973 period.[10]

There are two major issues in the foregoing situation to which governmental agricultural policy must be directed: 1. the downward trend in cow numbers and milk production, and 2. the continually decreasing numbers of dairy farmers in Alberta. Decisions must be made to either allow present trends to continue, or to attempt to slow, stop or reverse these trends.

The following is Canada's position[11] in the world dairy industry and will give perspective to a consideration of present Federal and Provincial agriculture policy relating to the dairying.

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[9] From interim Alberta Dairy Board report.

[10] Alberta Dairy Branch, Department of Agriculture, "Production of Butterfat and Butter" Weekly Report for Week Ending August 24, 1974. (Edmonton: ADA, August 30, 1974).

[11] U.S.D.A., Foreign Agricultural Service, Foreign Agricultural Circular (Washington: USDA, August, 1972).

1. Canada is ninth in total pounds of milk produced (17,770 million pounds in 1971, compared to 182 billion pounds in U.S.S.R. and 118 billion pounds in the U.S.A.).

2. Canada is fifteenth in per capita milk production (816 pounds, compared to 4,710 pounds in New Zealand and 746 pounds in the U.S.S.R.).

3. Canada's trade balance in dairy products has traditionally been as a net exporter; however, the trend in recent years has been toward an equalization of exports and imports. Net export balances of $75,420,000 in 1971 and $49,447,000 in 1972 indicate this trend. Significant quantities of butter were imported into Canada during 1973 and in the first part of 1974. This importation of butter was required due to the traditional producers of farm separated cream, either converting to bulk milk in a fluid or industrial milk market or ceasing operations completely.

Current Federal Government Dairy Policy

The Federal Government, through the agency of the Canadian Dairy Commission, continues to support the dairy industry in the 1974-75 dairy year by means of market support for major dairy products and direct subsidy payments to producers of industrial milk and cream. Previous to April 1, 1974, an involved double quota system of supply management was used with an export assistance holdback on a portion of the subsidy. However, since most provinces were experiencing considerable difficulty in maintaining their production levels in order to preserve their right to the subsidy quota, the Canadian Dairy Commission removed all restrictions on quotas as of April 1, 1974 in all provinces under the market sharing plan. This includes Alberta. A farmer's quota now is the amount of milk he ships to the plant. The major deterrent to increased milk production in the past seemed to be the threat of export assistance holdback. In effect, the Canadian Dairy Commission, until April 1, 1974, was using a surplus supply management policy at a time of short milk supply.

The outlook for the dairy industry in 1974-75 is stability of markets for milk and cream within the supply management system. Guarded optimism may be justified for increased returns to dairy producers based on the low stocks of dairy products, strong demand in Canada for milk and milk products, prospects for graduated entry and formula pricing[12] and lower production costs in 1974 compared to 1973 due to a more favorable feed supply and thus lower prices for feed.[13]

The Federal Government dairy policy aims to maintain a viable dairy industry in Canada and to gradually shift to the consumers the cost of the subsidy now paid to producers.

Current Provincial Government Dairy Policy

The agriculture and dairy policy of the present provincial government in Alberta is expansionist. Evidence of this policy is:

---

[12] For description of proposed formula pricing and graduated entry see Appendix F.

[13] G. J. Dobson, Canadian Agricultural Outlook Conference 1973, Outlook 1974, Situation 1973 (Ottawa: Marketing and Trade Division, Economics Branch, Canada Department of Agriculture, 1973).

1. The appointment of the Minister of Agriculture as Deputy Premier, giving agriculture a prominence in the Cabinet and government not previously experienced;

2. The restructuring and expansion of the Department of Agriculture to include three Assistant Deputy Ministers, a Policy and Liaison Secretariat, a Farmer's Advocate, the Alberta Export Agency, the Agricultural Development Corporation, a Director of Administration, and the addition of four new divisions (Family Farm Division, the Irrigation Division, the Marketing Division and, more recently, the Dairy Division).

3. Large increases in the agriculture budgets of the past three years, from $13.5 million in 1971-2 to $42.7 million in 1974-5.

Some of the thrust and activities resulting from the above changes are:

1. The research and facilitation of the Liaison Committee.

2. Extensive credit availability and service to farmers and industry, including grants and subsidization of interest rates and guarantees.

3. Added attention and encouragement to family farms.

4. The added emphasis and services in the marketing areas, including the Food Laboratory, the Marketing Council, Market Intelligence, Nutrition and Food Marketing and Product Development.

5. The additional prominence and status afforded the dairy sector by raising it to division level, which has a direct communication line to the Assistant Deputy Minister rather than through a division director.

6. The relocation of the Dairy Division to Wetaskiwin, the projected 'Dairy Capital' of the Province.

Another factor indicative of the dairy policy of the Alberta Government is the Alberta Milk Yard Program,[14] which was a proposal of suggested policy circulated in the Alberta Department of Agriculture in June of 1973 for internal reaction. It is upon this Milk Yard Program that the Cowdominium concept contained in this thesis is based, and initial government policy in relation to it is contained in a paper entitled "An Hypothetical Dairy Co-operative for Alberta."[15]

During late 1973 and the first six months of 1974 a number of meetings were held with interested farm and urban groups to discuss the potential of large dairy cow complexes (Cowdominiums) in Alberta. The result has been a tour of large dairies in Utah and Arizona by a group of fourteen farmers and five government specialists and the formation of three co-operatives in Alberta which have each made proposals to the Provincial Government for assistance in the establishment of 1,000-cow dairy enterprises in the Province. See Appendix M.

Statement of Purpose

The purpose of this work is to suggest a feasible alternative to the smaller, family-type dairy farmer which will allow him to maintain his life style, as well as give him (i.e., his labor) an opportunity to remain economically relevant in the dairy industry. This must be accomplished within the current policies of both the Federal and Provincial Governments, that being supply management and the preservation of the family farm in an expanding agriculture, respectively. A further consideration is the necessity for agriculture to become viable without subsidization.

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[14] See Appendix G

[15] See Appendix H

Assumptions implicit throughout this work are: 1. that the measure of government control in the milk industry that has existed for the past thirty to forty years will continue indefinitely, providing the necessary spread between cost of production and revenue for average and above average milk producers in terms of economic efficiency, and 2. that the interpretation of the meaning of "preservation of the family farm" be in terms of economic relevancy rather than in the absolute sense, the latter being impossible in any case.

The concept of the Cowdominium presents a specific challenge to the traditional "agricultural fundamentalist"[16] type farmer. It is a form of integration which requires that the participants give up some of their freedoms of action, which philosophy has so characterized the farmers of western Canada. He must change many of his philosophies and activities.

The case for integration is best stated as follows:

> There is much good in integration. With proper direction it will result in increased production, efficient distribution, controlled quality, uniform supply, stable prices and increased incomes to many producers. The fact that an individual producer may surrender some of his managerial freedom is a small price to pay for the advantages that flow out of an integrated system.[17]

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[16] See Appendix I.

[17] E. L. Butz, Don't Be Afraid of Integration; Better Farming Methods, cited in Dairy Cattle: Principles, Practices, Problems, Profits, R. C. Foley, D. L. Bath, F. N. Dickinson and H. A. Tucker, Philadelphia: Lea and Febiger, 1972).

In change, the farmer faces a challenging situation.

> Knowledge is change . . . and accelerating knowledge acquisition, fuelling the great engine of technology, means accelerated change.[18]

All members of society face change at varying rates. Coping with and adjusting to change is a major factor of survival for the farmer.

> To survive, to avert what we have termed future shock, the individual must become infinitely more adaptable and capable than ever before. He must search out totally new ways ...[19]

The cushioning of 'future shock' may be accomplished by a method known as 'consequence analysis'.[20] This simply involves a procedure used to determine the effects and results of certain changes in a system prior to those changes being made. As a type of applied research, or experimental farm, Cowdominiums as pilot projects have some potential. The use of 'consequence analysis' may be particularly appropriate in their implementation, in order to assist those farmers who choose later to become involved in a Cowdominium, and to provide government with valuable information not otherwise available. These large 1,000-cow dairy operations will pool the resources of farmer members. The resulting gains from economies of size, specialization and superior management will provide a better return to investment and labor for all investors in the projects. There are several of these large dairy cow co-operatives operating in Utah at the present time and much information has been obtained from them in the pursuit of this study.

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[18] Alvin Toffler, Future Shock (New York: Random House Inc., 1971). p.32.

[19] Ibid. p.35.

[20] Ibid. p.35.

CHAPTER II

THE BASIS OF PRESENT TRENDS IN DAIRYING IN ALBERTA AND CANADA

Farm separated cream producers are characteristically the smaller producers in the industry and in terms of absolute numbers, constitute the majority of those producers who have been shutting down their production units over the past ten years.[1] The basis of this trend may be considered as being:[2]

1. Economies of size in dairying.
2. Management limitations.
3. Labor problems.
4. Lack of specialization in dairying.
5. The rising cost of production.
6. Government regulation and control in the industry.
7. The state of technology.
8. Owner-equity level considerations.

A theoretical dairy co-operative will be presented in Chapter III using the foregoing items as criteria, with the intent of providing some solutions to the existing problems which at the same time will preserve the family farm.

---

[1] Statistical Records, Dairy Branch, Alberta Department of Agriculture.

[2] Drawn from the survey done and reported here in Appendix E, from interviews with and records of Farm Credit Corporation officials, and from interviews and contacts with farmers in general.

Economies of Size in Dairying

How large a dairy farm should be to operate most efficiently depends on several considerations. The opinion that the large farm is more efficient until management limitations become restrictive generally prevails. Precisely at what level this occurs is difficult to determine, but obviously depends on the quality of the management. The highly diversified homesteader-type farmer may reach his management limitation at the thirty cow level, whereas the more specialized highly trained and experienced man is able to manage several hundred cows in one herd.

A study done in Minnesota on one-, two-, three- and four-man dairy farms was made and the results are summarized in Appendix J and Table 1.

Table 1. A Comparison of Selected Characteristics of Dairy Farms

	Situation No. 1	Situation No. 2	Situation No. 3	Situation No. 4
Cows per man	35	35.1	36	37
Total crop land per cow, acres	5.8	5.76	5.76	5.88
Dollars invested per cow	3865	3351	3005	2944
Gross income, dollars per cow	743	740	740	743
Total costs per cow, dollars	642	597	576	578
Net returns per cow, dollars	101	143	164	165

Source: Derived from Appendix J.

It is significant to note from the foregoing calculations that the net returns per cow are closely correlated to the investment per cow, and that economies of size, as far as investment is concerned do exist up to about the 100-cow herd size, and then decrease. There is an indication in this result that capital is most efficiently utilized when employed at about the 100-cow herd size, and that expansion of a unit above this level should be done in 100-cow increments in order to maintain that degree of efficiency in utilization of capital. A possible explanation for this would be that the economies realized are in housing and equipment related to housing.

Conditions determining capital investment in housing and equipment per cow could be considered comparable in Minnesota and Alberta. At the time of the Minnesota study (1968), the average dairy herd in Minnesota was twenty-two cows and in Alberta, approximately sixteen cows. The overall conclusion of the study was that when maximum net return is the primary motive, Minnesota dairy farmers should progress toward 150-cow units. Projection of this conclusion from the time of the study (1968) to the present, assuming top management and relative stability in the rate of change in technology causes one to conclude that the recommendation should now be at the same or a higher level for maximizing net returns.

Labor efficiency in relation to herd size is illustrated in Appendix K. It is immediately evident from the graphs that as herd size increases from 20 to 50 cows, labor efficiency increases from less than 200,000 pounds of milk per worker annually to about 350,000; and from more than 0.8 hours of work per 100 pounds of milk to less than 0.6 hours.

Conclusions that may be drawn from the foregoing information are that the Alberta milk and cream producers must exploit economies of size existing in dairying to survive in a competitive economy. Some are able to do this, others are opting to remain as they are as long as possible, liquidating their dairy assets as economic and other pressures make it expedient to do so. The purpose of this study is to provide an additional alternative to the dairy farmer who will not, or cannot, expand his operation, and yet would prefer to remain in productive dairying.

Management Limitations

Authors generally agree that quality of management is of major importance in the degree of success of a commercial enterprise, including a dairy farm. The following quotation provides some insight into the relative significance of management.

> Good managers can make do with limited land, older buildings, worn machinery, average livestock, and the available labor, but a poor manager may operate at a loss in spite of fertile fields, modern buildings, the latest models of farm machinery, an abundant supply of labor, and a herd of high-producing dairy cattle.[3]

Good managers may be identified on the basis of the financial position of the enterprise which they manage. Therefore, one could conclude that those dairy farmers who survive in the long run are good managers and those who do not survive are poor managers.

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[3] R. C. Foley; D. L. Bath; F. N. Dickinson; and H. A. Tucker Dairy Cattle: Principles, Practices, Problems, Profits (Philadelphia: Lea and Febiger, 1972).

A review of the records of a major agriculture lending agency and discussions with officials of that agency has provided supporting evidence for the foregoing discussion on management.[4] In the loan officer's opinion, poor management accounted for over 80 percent of the reason for farmers' failure. The number of foreclosure actions being taken have increased each year since 1970 although the total is a very small percentage of the total loans made.

Major areas of activity in the operation of a large dairy farm are:

1. Herd management (including nutrition, feeding, general herd health, mastitis control, breeding, production records, culling, housing, milking, identification, daily surveillance, economics of ration formulation);
2. Dry cow management (including feeding, general health and mastitis control, calving and calf mortality rate);
3. Young stock management (including feeding, breeding, culling, general health, identification and records);
4. Calf management (including feeding, housing, identification, disease control, general health, culling and marketing of culls and bull calves, if sold, and if retained feeding and fattening of culls and steers);

---

[4] Foreclosure proceedings on all farms from 1970 to 1974 were examined and details relating to the reasons for failure were obtained. This source is regarded as confidential and cannot be further identified.

5. Land management (including soil analysis, crop rotation, fertilization, irrigation); and

6. Feed production management (including varieties and quantities to be produced, seeding and harvesting, feed analysis, feed storage).

Each of the foregoing activities may be seen as largely separate entities on a larger dairy farm and would require a high degree of management expertise. However, the major challenge in farm management is the co-ordination of all these activities into one system with one ultimate objective, operational efficiency. In systems thinking,[5] the whole system is greater than the sum of its parts, and efficient operation of the whole is dependent not so much on the relationships of the parts to each other, as on their relationship to the whole system. This specific relationship involves overall management and decision making relative to growth, consolidation, financial arrangements, labor relations, integration and timing, consistent with the goals and objectives of the system.

Major elements of superior management have been observed to be:[6] the setting of definite goals and well-planned programs; the use of available information and services; co-operation between labor and management; and the optimum use of all resources.

The following quotation suggests ways in which management may be recognized and evaluated.

---

[5] F. E. Emery, Systems Thinking (Bungay, Suffolk: Richard Clay (The Chaucer Press) Ltd., 1971).

[6] R. C. Foley, *et al*., *Op*. *Cit*., pp. 60-62.

> Management is both an art and a science. The successful farm manager has specific and definable goals for which he plans ahead. He identifies problems on an economic and realistic basis by observing the difference between what the situation is and what it ought to be. He separates major decisions from minor ones and allocates his management time accordingly. He is energetic, exercises initiative, is willing to take risks, and is always ready to take advantage of opportunities when they arise. He shares his time and talents in both business and community affairs with his wife and family. He is technically competent, employing up-to-date production methods and using appropriate budgets to evaluate alternatives. He delegates responsibility where indicated and recognizes superior performance appropriately. He buys and sells effectively by keeping informed about markets and prices. Last, but by no means least, he is honest, and ethical and has mastered the art of motivating people to work for and with him.[7]

It is very difficult to assess the management capability of the managers of Alberta's dairy farms. For Canada as a whole, and probably indicative of the Alberta situation, the survey in Appendix L may be considered. Assuming that the parameters used in the Canadian Dairy Commission survey are indicative of superior management, it is apparent that cream producers in Canada are the least competent managers of dairy farms in Canada since they lag behind other producers in the adoption of technology.

In a survey of cream producers in Alberta in 1973,[8] approximately 30 percent of the producers polled were using performance testing and over 50 percent were using artificial insemination. These are significantly higher percentages than the Canadian Dairy Commission study showed, and are not representative of the Province as a whole. The sample used in the Alberta survey was closely correlated to the respondents to a mailed questionnaire; as a result, some response bias may be reflected in the totals.

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[7] L. S. Hardin, "Measuring Management Ability," New England Farm Finance News, Vol. 20, No. 3 (March, 1965).

[8] See Appendix E.

In light of the information considered here, it may be assumed that the level of management expertise employed on cream producing farms in Alberta may be adequate in maintaining status situation, that is, with no growth, nor changes in technology, but is the major limiting factor in any expansion or up-grading of the production unit. Improved management is requisite to any growth and development in this sector of the industry. As a group, fluid milk producers employ the best management in the industry, with manufacturing milk producers close behind, having made significant improvements in the past fifteen years.[9] This level of management should not be interpreted, however, as indicating that fluid milk producers do not have need for improvement in their management expertise, in terms of either operational efficiency or technological change.

Labor Problems

The labor problem in the dairy industry stems from the regularity and consistency with which the dairy cow produces milk. Modern technology has yet to produce the five-day, forty-hour per week dairy cow. The average dairy farmer (fifty-three years of age) is prepared to endure these labor demands until his retirement, but his sons are not interested in becoming involved in such a demanding enterprise.

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[9] See Appendix L.

The availability of hired labor for farm work has become increasingly more difficult as urban wage rates and fringe benefits improve. It is somewhat of an impass: the farmer-boss expects the hired man to work long hours at low rates of pay with few fringe benefits, while the hired man expects urban working conditions, pay and fringe benefits.

An emergency farm help program was initiated in Alberta in 1973 on a temporary basis and has now been established on a permanent basis. The intent of the program is to bring together available urban labor, (usually part-time) and farmers needing that labor. Some initial success has been experienced; however, it is too early for an objective assessment with regards to the overall effectiveness of the program.

In the Alberta survey of cream producers,[10] a total of seventy-seven (22 percent of total and 44 percent of those quitting) listed labor problems as a reason for closing out their dairy operations in less than five years. It is reasonable to deduct from the labor problems existing in the dairy industry that working conditions are such that labor is not attracted and, due to the labor requirements of the expanding and larger milk production units, labor problems are deterministic in any anticipated expansion of existing dairy farms.

Lack of Specialization in Dairying

Pioneer farmers in North America were highly diversified for reasons of survival. As communication and transportation improved and markets for agricultural products increased, some specialization occurred in agriculture, particularly in dairying.[11] While dairying may be considered a specialization of agriculture in general, it must be recognized that, in itself, dairying is a relatively diversified operation.[12] The question of further specialization within dairying must be considered, particularly in view of management limitations and labor problems inherent in the industry.

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[10] See Appendix E.

In general, specialization results in greater efficiency.[13] It is reasonable to conclude that a twenty to thirty-cow dairy farmer responsible for providing the management decisions and the labor requirement of his farm may have reached the limits of his capabilities with his present unit. If he considers expansion, he must recruit more labor. If it is necessary to hire labor, the farmer faces the labor problems and limitations discussed previously. Specialization offers some hope to the small dairy farmer. If he were to specialize in milk production or feed production, he would, through increased efficiency, be more productive and increase the returns for his labor.

> Specialization and division of labor by tasks provide one basis for an hypothesis of ranges of increasing returns to scale in agriculture.[14]

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[11] R. C. Foley, _et_ _al_., _Op_. _Cit_., p.25.

[12] See discussion under "Management Limitations" earlier in this chapter.

[13] R. C. Foley, _et_ _al_., _Op_. _Cit_., p.25.

[14] Earl O. Heady, _Economics of Agricultural Production and Resource Use_ (Englewood Cliffs, N.J.: Prentice-Hall Inc., 1961), p.357.

There are two dimensions, to increased efficiency through specialization; namely, the gains from employing labor in the way in which it is specifically talented and trained, and the gains from increasing the expertise of labor through practise and further training.

> Some dry-lot dairy farms also are large enough to realize these scale economies. However, most farms never have attained a size such that these economies, labor specialization particularly, have been realized to any significant degree. It is not that scale economies are absent from agriculture; the great majority of producing units never attain a volume large enough so that increasing physical returns become important. Even for farms employing 2 or 3 men, the seasonality and the spatial and biological character of agricultural production serve to deter the scale gains realized in small non-farm firms of approximately the same size.[15]

It is implied in this quotation that economies of scale through specialization may exist in agriculture, but that nobody has really attained the size necessary to realize them. It is further suggested that the seasonal nature of most agricultural production is a deterrent to realization of such economies. This is an encouraging aspect of the situation for dairying because relatively consistent milk production throughout the year is conducive to developing such economies. Fluid milk producers have been successful in levelling some of the seasonal fluctuations in milk production; other milk producers have not as yet been so successful.

Specialization in combination with complementary diversification in dairying is a possibility worthy of dairy farmers' consideration.[16]

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[15] *Ibid*., p.358.

[16] R. C. Foley, *et al*., *Op*. *Cit*., p.25.

For example, a dairy farmer could specialize in dry-lot handling of his dairy herd, and thus purchase all feed requirements; then he could diversify into a calf raising program which would be complementary to his dairy herd. The calf project, if well managed, could provide replacements for his own and other dairy herds, as well as produce veal and beef through feeding out the bull calves and culls. Another possibility would be custom milking cows in a fully equipped milking parlor only partially utilized by the farmer himself.

Recent dramatic price increases in dairy cattle feed, summarized in Table 2, provide additional support to the need for further specialization in milk production. Superior management is required to cope with such changes.

Table 2. Dairy Livestock Feed Values in Edmonton Region, 1970-1973

	1970	1971	1972	1973
Purchased roughage, dollars per ton	23.71	23.83	24.43	46 (est.)
Home grown roughage, dollars per ton	21.64	19.31	21.54	30 (est.)
Purchased grain and concentrates, cents per pound	1.86	2.36	2.83	4.5 (est.)
Home grown grains, cents per pound	1.58	1.41	1.79	3.1 (est.)

Source: Alberta Department of Agriculture, Marketing Division, The Edmonton Dairy Farm Business Summary (Edmonton: ADA, 1973). Note: The estimated figures are the prices at year end (1973), not averages for the year. For range of feed prices during 1973 see Appendix Q.

Rising Cost of Production

Feed costs constitute the major cost in milk production.[17] Returns to management and profit per cwt. of milk in the years 1969-71 were much higher than in the years 1972-73 due to rising factor prices outstripping increases in milk prices. The dramatic increase in feed prices in the latter part of 1973 and early 1974 forced production costs even higher. A summary of these increases is provided in Table 2.

Fluid milk prices in Alberta are determined on the basis of the Dairy Farm Business Summaries compiled by the Marketing Division of the Alberta Department of Agriculture. Traditionally, the Alberta Dairy Control Board has adjusted milk prices once a year or as requested by the milk producers or processors.[18] With rapidly rising production costs, particularly feed prices, this system has not been satisfactory because of the time lag between price increases in feed costs and the authorized increase in milk prices. This time lag in milk price adjustment to production costs has been a deterrent to producers maintaining or increasing milk production.

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[17] The Edmonton Dairy Farm Business Summary 1972 shows total feed cost per cwt. of milk to be $2.50 in a total gross cost of $6.71. The feed cost for 1973 will be more than double 1972 according to preliminary estimates.

[18] The Public Utilities Board of the Province of Alberta has authority to determine and set minimum producer and distributor selling prices for fluid milk which are then administered by the Alberta Dairy Board. Hearings are held by the Utility Board annually or as requested by the producers or processors. Rising production and processing costs have necessitated frequent hearings and price adjustments in the past year. A system of formula pricing of milk correlated with costs of production and processing is to be implemented soon.

There has also been some producer dissatisfaction with the findings of the Dairy Farm Business Summaries. One of the elements of dissatisfaction is the feed price schedule used in the study. This discontent is reflected in a C.R.D.[19] published in July, 1973. The Consensus Research Data technique is intended to reveal some of the errors inherent in averaging statistical data. The opinion of the producers involved in the C.R.D. regarding feed prices was that the price levels used in the Dairy Farm Business Summaries were too low. Feed prices used in the C.R.D. were $37.50 and $40 per ton of roughage, 2.75 cents per pound of prepared feeds, 2.14 cents per pound of mixed grain. The roughage prices used in the C.R.D. are much higher than the roughage price of $21 to $24 used in the Dairy Farm Business Summaries for the same year.

Therefore, rising feed prices are an equal, if not greater, deterrent to increased milk production in the manufacturing and farm separated cream sectors as in the fluid milk sector. Dairy farm production decisions are relatively long-term. It requires from one to three years for a milk producer to significantly increase his milk production through breeding and culling programs. Drastic fluctuations in feed costs discourage producers from expanding their dairy herds.

The milk price structure throughout the industry is determined and controlled by government agencies such as the Alberta Dairy Control Board and the Canadian Dairy Commission. Production costs for fluid milk producers have generally been considered higher than for manufacturing milk and cream producers, irrespective of feed costs. In September of 1974 approximate gross returns to producers for the three classes of milk testing 3.5 percent fat were $10.31 per cwt. for fluid quota milk (an increase of $1 to $2 is expected soon), $9.50 per cwt. for manufacturing milk and $5.77 per cwt. plus the skim milk, for farm separated cream. The value of skim milk is not easily determined due to the difficulty of utilizing it efficiently on the farm. At current feed prices it may be valued at $1 to $2 per cwt. Feed costs are common to all three types of milk producers with feed conversion efficiency probably higher in fluid milk operations. See Appendix K.

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[19] B. W. J. Clayton; W. Loree; and J. Wilson, A Consensus of Costs and Returns for Fluid Milk (Calgary, Alberta: Alberta Department of Agriculture, July, 1973).

Government Regulation and Control in the Industry

The limited shelf life of milk and milk products has necessitated a very close correlation between supply and demand, particularly in the past when processing procedures and storage facilities were less effective than today. This fact combined with the tendency of farmers to produce milk seasonally has resulted in a significant degree of government regulation and control in the milk industry. These controls have taken the form of quota systems, retail price maintainance, subsidies, and floor prices for milk products. There are also import and export policies protecting the producer and consumer. A more dependable supply of milk to the consumer throughout the year and a more stable price to the producer have been some of the favorable results from this government regulation. However, the quota system with a guaranteed price has discouraged the efficient producers from producing more milk, and has maintained the less efficient producer of milk.

In a recent study[20] carried out at the University of Alberta, it was recommended:

1. That the Federal Government re-evaluate federal dairy policy and programs in order to define long run objectives and to develop long run programs which are consistent with producer, consumer, and taxpayer interests.

2. That transferability of fluid milk quota rights be maintained to provide a signal of the efficacy of administered price levels for fluid milk and that the level of and changes in fluid quota values be used by fluid milk boards and agencies in determining whether changes in administered price levels are warranted.[21]

3. That the practice of allowing graduated entry of qualified manufacturing milk producers into the fluid milk market be adopted by all provinces.

4. That the practice of resale price maintainance of fluid milk, which involves the administrative setting of minimum retail prices, used in several provinces be abandoned.

The first recommendation of the report has been a concern of the dairyman for many years. The practice of the Canadian Dairy

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[20] M. M. Veeman and T. S. Veeman, The Impact of Federal Dairy Policies and Provincial Milk Boards on Canadian Consumers Edmonton: Department of Agricultural Economics and Rural Sociology and Department of Economics, University of Alberta, 1974).

[21] Fluid quota in the Edmonton area is currently being sold at very low prices.

Commission has been to announce dairy policy on April 1 of each year without any prior or long term policy relative to imports, exports, expansion or contraction of the industry. This is not sufficient lead time for the serious dairy farmer to make rational production decisions. The determination of long-run policy by the Canadian Dairy Commission would benefit producer, consumer and taxpayer.

The basic theory of recommendation number two does provide an accurate indicator of producer reaction to current price levels. However, a mechanism would be required whereby price levels and price changes of fluid quota could be established.

Recommendation number three will become a reality in Alberta, January 1, 1975. See Appendix F for details. Officials of the Alberta Dairy Board do not expect any significant improvements in the situation for producers or consumers as a result of Graduated Entry. A very low-key advertising of the new scheme amongst producers has resulted in an enthusiastic response in some areas.

Recommendation number four, if implemented would result in a more competitive situation at the retail level. It would effect some efficiencies in house to house deliveries and precipitate a store differential. Vertical integration in milk processing and retailing in Alberta has resulted in what has been termed 'embarrassing profits' because of retail price maintainance.

The State of Technology

The milking machine is a relatively recent innovation in the dairy industry, being little more than 100 years old. Its nearly universal use is little more than twenty years old. In terms of technology and labor saving the milking machine is very significant. More recent technological advances and innovations include the farm bulk tank; the various types of milking parlor i.e. 'straight-away', 'herring bone', 'carousel', 'polygon'; the different feeding, housing and manure disposal systems; the prep-stalls and electronic devices for pulsation control and automatic take-off of milking machines. All of these advances have required substitution of capital for labor to the extent that in the 24 point polygon milking parlor, one man is able to milk 140 cows per hour. A general rule to guide investment decisions is that if the amortized cost of the proposed investment is equal to or less than the labor it saves, then the investment should be made. Some farmers fear debt and try to be financially independent.[22] Many of the small milk and cream producers have chosen not to adopt new technology and they are leaving the industry as they see the required large capital investment and their own retirement on a collision course.

Owner-Equity Level Considerations

A significant portion of the gross income from a dairy herd is a return for the operator's labor and management, plus interest on his investment. The net profit from a dairy herd operation is relatively small, on the average, so that a shift from farm-supplied labor to hired labor and from a high equity to a low equity position represents a loss of income to the farmer. This situation brings into sharp focus the equity level and family labor necessary to ensure the operator an income. Studies done in the U.S. illustrate the effect of owner equity and farm labor on gross income. Results of these studies follow in Tables 3 and 4.

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[22] Aaron G. Nelson and William G. Murray, Agricultural Finance (Ames, Iowa: Iowa State University Press, 1967) pp. 93-96.

Table 3: Family Farm Income on Twenty-nine Farms Programmed For Annual Operator Earnings of $5,500 With Variable Percentages of Equity and Family Labor

Situation	Annual Operator Earnings	Returns to Capital	Returns to Family Labor	Total Family Income
		(dollars)		
No equity, no family labor	5500	-	-	5500
50% equity, no family labor	5500	2418	-	7918
100% equity, with family labor	5500	4836	1640	11,976

Source: H. E. Barnhill, Resource Requirements on Farms for Specified Operator Incomes, Agricultural Economic Report 5 (Washington: Farm Production Economics Division, ERS, USDA, November, 1964).

The selected data in Table 3 illustrate the importance of equity and labor. On a dairy farm programmed for operator earnings of $5,500, with all investment capital borrowed and without any labor contribution to the farm by other members of the family, the total family income would be $5,500. When the operator has a 50 percent equity in the farm and the family contributes no labor, the family farm income increases to $7,918, the result of returns to capital on the 50 percent which is owned. The total family farm income is more than doubled when the operator has 100 percent equity and members of the family contribute $1,640 worth of labor to the enterprise.

Table 4 shows labor income on selected New York dairy farms in 1966. Labor income is the measure frequently used to evaluate the returns to a farm owner for his labor and management.

Table 4: Labor Income on Selected New York Dairy Farms, 1966

	Average of Top 10%	Average of All Farms	Average of Low 10%
		(dollars)	
Total farm receipts	70,107	39,180	24,778
Total farm expenses	45,252	27,109	21,655
Net Farm Income	24,855	12,071	3,123
Interest on capital investment of 5%	6,042	3,850	3,198
Labor income	18,813	8,221	- 75

Source: C. A. Bratton and E. L. La Due, Dairy Farm Business Summary, 1966, A.E. Res. 222 (Ithaca: Cornell Univ., Department of Agricultural Economics, July, 1967).

An opportunity cost of capital is subtracted from net farm income to arrive at labor income. It should be noted that the figures are averages. Farmers in the average of the top 10 percent made reasonable labor income while those in the average low 10 percent made no labor income. The exponentially increasing capital requirements required to move from the lowest decile to average to the highest decile of these New York dairy farms, underlines the capital and equity relationship to labor returns. An average or high labor return is the rational goal of most farmers, and its realization is the result of the efficient operation of a dairy farm of adequate size. The alternatives for farmers who realize a negative labor income are to increase the size of their operation in capital terms or adjust out of dairying.

Summation and Challenge

Preservation of the family dairy farm under such stringent prerequisites for survival may appear to be an improbable proposition. The co-operative cowdominium concept, however, may offer some opportunity for keeping the family basis of dairying.

First, there are those family farmers who have, are, and will continue to be able to cope, either through expansion, partnership or some family arrangement. Second, there are those farmers, who for reasons of health, age, capability or misfortune, will opt to retire. Third, there are those family farmers who do not have the capability to expand and yet prefer to remain associated with primary production in agriculture and the accompanying lifestyle. The alternatives facing these people other than adjustment out of agriculture, are very limited.

The Cowdominium concept is developed in the following chapter. The concept should conform to the following criteria to provide the potential needed to attract participants:

1. It must exploit economies of size that exist in dairying.

2. It must have superior management.

3. It must utilize labor on a basis comparable to other industry in terms of hours of work per day and per week, rates of pay, holidays and all fringe benefits enjoyed by urban labor.

4. It must provide for a degree of specialization for participating dairy farmers and others.

5. It must operate with average or less than average costs of production.

6. It must operate within present government regulation and control, but should explore the possibility of amendments to serve the needs of the dairy farmer and the consumer.

7. It must utilize the latest in dairy technology in management and equipment and buildings.

8. There must be owner-equity and returns to labor levels that will provide reasonable debt retirement terms and adequate incomes for participating farmers.

To the extent that these criteria can be satisfied by a model, it may be concluded that the Cowdominium concept is ready for consequence analysis. The next chapter explores a theoretical model for a cowdominium.

CHAPTER III

BUILDING THE MODEL

Cowdominiums have been planned using two principle sources of information and direction:

1. Feasibility studies provided by Alberta Department of Agriculture economists.

2. The Utah State University Dairy Team at Logan, Utah, and the Gunnison Dairy Co-operative at Gunnison, Utah. See Appendix M.

A 1,000-cow model was developed on the basis of experience in Utah and Arizona, and a cash flow analysis and study. Details of the feasibility studies, pro forma, rate of return and some sensitivity of the model to changes in assumptions is provided in Appendix N. The model can achieve a positive cash flow position within an acceptable time limit, under certain financing and productivity assumptions.

Economies of Size

The studies indicate that a herd of 1,000 cows is large enough to exploit economies of size and small enough to be manageable in Alberta. The cash flow of a herd this size is balanced or positive after three years of operation. The economies of scale of [illegible] significantly less than 1,000-cow herd are not considered adequate to carry the management, labor and other overhead costs.[1] If expansion is anticipated the smaller unit must initially carry excess investment.

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[1] Earl O. Heady, Op. Cit., p.358.

The reasons for limiting herds to 1,000 cows at the outset, are a lack of management expertise immediately available, and the inherent resistance of the dairy farmers, particularly cream producers, to such large complexes. Appendix M indicates that the Gunnison group would start at 3,000 cows instead of 1,500 if they were to begin again.

The availability of young stock, supplies and equipment will influence the size of the initial herd. The initial herd could start at 500 cows with expansion to 1,000 or 1,500 cows within three years to be brought about by natural increase or otherwise. More stock would have to be purchased to supplement the herd growth over the three year period. This alternative has the added advantage of giving management an opportunity to gain some experience. However, it also has costs, in terms of cash flow, production and initial challenge. (See Appendix O and compare cash flows and production of 500 and 1,000 cow herds in each of first five years.) If such a unit were to be initiated at the 500 head level it should be expanded as soon as possible to a minimum of 1,000 cows. The milking parlor and farm bulk tank should be originally installed to accommodate the maximum size of herd planned, while the barns could be built in units as required.

Resource Requirements

The resource requirements of a 1,000 cow dairy operation are about $2,000 per head. This breaks down to approximately $1,200 per head for housing, equipment and miscellaneous, and $800 per head for the animals. This does not include operating capital. (See Appendix N) The price of the producing cow is derived by adding to the price of the open heifer, the cost of delivering that heifer to the milk production line. This cost includes feeding, breeding, housing, medicine and other costs incurred. The cost of buildings and equipment required were derived by Government economists and engineers providing plans and blue prints to contractors for estimates. (See Appendix N)

These prices are subject to change. In fact most equipment dealers will not quote prices in absolute terms, because of rapidly changing costs in the industrial sectors of the economy.

Assumptions

The assumption in the study that subsidy quota would cost $84,875 has proven to be ill founded as a result of recent changes in Canadian Dairy Commission policy. This is a plus for the financial position of the study.

The assumed annual milk production per cow averages of 10, 10.5, 11.5, and 12 thousand pounds in the first five years, then continuing at 12 thousand pounds thereafter is reasonable. However, the average annual production per cow of the cows on the D.H.I. program in Alberta is over 12 thousand pounds. The cows in the Cowdominium may be expected to produce above the average.

A 10 percent cull and death ratio in year two, then a 25 percent cull and death ratio thereafter is average assuming good management.

Assumptions of $65 per ton for hay; $20 per ton, in the pit, for silage; and $130 per ton for a prepared grain ration are region and time specific. Extreme fluctuation of feed costs seriously affects the feasibility of the project. The prices for feed used in the feasibility studies are top prices for the preceding year, in order that the indications of the study will be at least as stated or better. The same is true for labor costs used in the study.

Price assumptions for bull calves and cull cows are placed at market beef prices. These sales account for ten to fifteen percent of total dairy farm income.

Assumed milk prices are those prices paid for manufacturing milk by dairy plants, plus the Canadian Dairy Commission subsidy of $2.57 per cwt. This amounted to $9.41 per cwt. gross, in August, 1974. Negotiations are in progress between the Provincial and Federal Governments in regard to Cowdominiums qualifying for Canadian Dairy Commission subsidy. Without the $2.57 per cwt. subsidy, the Cowdominium is not feasible. See Appendix F for further details. It is interesting that the possibility of such a unit obtaining a fluid milk quota is promising. Assuming the Cowdominium obtained a fluid quota, the chance of obtaining Canadian Dairy Commission subsidy would be greatly enhanced. The problem however, is timing, inasmuch as the Cowdominium could not be started until approval for Canadian Dairy Commission subsidy is obtained.

On the basis of the discussion in Chapter II on Government regulation and control it is assumed that the price/cost ratios between milk and costs of production will be maintained indefinitely. In fact in the long term that ratio may improve for the producer, in view of present market conditions, Government policy, and the prospects under Graduated Entry. See Appendix F.

The potential for improvement in returns to the cream producer entering the co-operative are considerably greater than for the milk producer, because current cream price, plus an allowance for the skim milk used on the farm, grosses the cream producer about $7 per cwt. for 3.5 percent milk. This increase in price to $9.41 per cwt. for the cream producer, in addition to probable increases in production per cow in the Cowdominium, could theoretically double the dairy income of the cream producer, who opts to become part of the co-operative.

Financing

Financing a project of this size is a major undertaking and the arrangements must be tailored to the farmer, the urban shareholder, the money lender, and the needs of the Cowdominium. The Provincial Government established the Agricultural Development Corporation in 1971 to assist farmers in their need for capital. The Corporation (A.D.C.) is able to make direct loans, or they are able to guarantee a loan from a lender of the farmer's choice.

Based on owner-equity considerations in Chapter II, and on policies of the A.D.C., the minimum owner equity is 20 percent of the total capital investment. Therefore, a Cowdominium with total capital investment of $2 million would require (2,000,000 x 0.2) = $400,000 in local equity. In terms of shareholders and share prices, the principle considerations are a share price within the financial resources of the small cream producing dairy farmer, yet high enough to ensure local individual commitment to the project. The theoretical limits of shareholders and share price are infinite. With regard to the resources of the cream producer, the legal aspects of co-operatives, and the local preferences of farmers to date, the following limits appear reasonable. A $4,000 share with one hundred shareholders; or a $20,000 share and twenty shareholders.

Rate of Return

The study in Appendix N shows a $55,000 year growth in owner equity, which is an average return on owner's equity of approximately 25 percent the first year. Subsidization of this project by Government is difficult to justify with such a high rate of return. In view of this, government agencies may insist on periodical reviews of the position of pilot projects to prevent windfall profits to the shareholders through capital gains. These reviews will act as an inhibitor to the establishment of Cowdominiums, because the shareholders will be justifiably apprehensive about such procedures.

Management

Most authorities[2] agree on the overriding importance of superior management to the success of a large dairy cow complex. Management decisions involve the allocation of all resources. Managers must set goals, coordinate labor, procure feed, and set policy relative to breeding and feeding. They must be informed on market prices for both the inputs and the production of the project. There is also the decision to expand, or maintain existing production levels. Managers are concerned with the whole system, and the way in which each segment of the operation relates to the total project. A priority listing of qualifications for a manager of this type would be: experience; business management training, and technical training.[3]

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[2] This includes all authors cited in this study and all contacts made in Utah and Arizona.

[3] This priority listing was made up from interviews held with managers of large cow complexes in Utah and Arizona.

Organizational Structure

The designation of the Cowdominium organizational structure as a co-operative is recommended for reasons of flexibility, tax considerations, (i.e. there are tax advantages that co-operatives have over corporations), and the general acceptance of the co-operative philosophy in the rural sector and in government. The relative acceptance of co-operative versus corporate farming is difficult to determine without a public opinion poll. Sufficeth to say that corporate farming runs counter to agricultural fundamentalism, which philosophy is still well rooted in rural sections and in government.

Sensitivity of Model

A consideration of some changes in assumptions and parameters in the feasibility study will indicate its reliability and its general position; be it conservative or otherwise. Appendix O is Appendix N revised. The following changes in assumptions were made:

1. The interest rate over the first three years was lowered to seven percent.

2. Milk price was raised from $8.50 to $9.41 per cwt; a reflection of market and the subsidy changes.

3. Hay costs were raised $15 per ton.

4. Grain ration costs were raised $20 per ton.

5. Herd feed consumption increased by 400 tons of silage, and decreased by 500 tons of hay.

6. Long term loan and investors' equity requirement increased by $302,449.

7. Replacement feed costs increased by $53.75 per head.

8. Dairy cow feed costs increased by $53 per head.

9. Average yearly operating capital interest decreased 1 3/4 percent and interest on feed raised 3/4 percent and on other operating capital 3/4 percent.

The net result of the foregoing assumption changes is a general improvement in the year end cash balances as follows:

Table 5: Year End Cash Balances of 1,000 Cow Dairies as Per Appendix N (original) and Appendix O (revised)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			(dollars)			
Appendix N	-1,051,400	-922,400	———	-23,300	18,025	22,400
Appendix O	-969,431	-990,771	89,723	25,618	73,493	77,868

Using the revised study, Appendix O, as a basis for comparison, the following changes in assumptions will be made and the effect on the yearly cash balance noted. Results are recorded in Table 6.

Changes in assumptions:

1. A 10 percent increase in total feed costs, i.e. a $65,761 per year increase. Result is a negative cash flow in fourth year. Project is still feasible.

2. A 10 percent increase in labor requirement i.e. an $11,000 per year increase. Result is that the project is still feasible.

3. A $2.57 decrease in the price of milk. Result is a negative cash flow in each year making the project not feasible.

4. Combination of all of the foregoing changes in assumptions. Result is negative cash balances throughout and the project is not feasible.

5. A 10 percent decrease in total feed costs. Result is a significant improvement in cash flow position and the project is feasible.

6. A 10 percent decrease in labor requirement. Result is an improved cash flow position and the project remains feasible.

7. A 10.6 percent increase in the price of milk. Result is an improved cash flow position and the project remains feasible.

8. A combination of assumptions five, six and seven. Result is improved cash flow positions and project remains feasible.

9. An average annual production per cow of 13,000 pounds of milk. Assume 6.0 percent increase in feed costs due to increased consumption.[4] Result is a significant improvement in the feasibility of the project.

10. An average annual production per cow of 15,000 pounds of milk. Assume 17.5 percent increase in feed costs due to increased

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[4] Percentage increase in feed costs associated with increased milk production. See Appendix Q for further details.

consumption. Result is a dramatic improvement in the feasibility of the project.[5]

Table 6: Sensitivity of Model to Changes in Assumptions as Reflected in Yearly Cash Balances

Assumption Change No.	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			(dollars)			
1	-1,035,192	-1,056,532	23,962	-40,143	7,732	12,107
2	- 980,431	-1,001,771	78,723	14,618	62,493	66,868
3	- 969,431	-1,247,771	-180,107	-269,932	-234,907	-230,532
4	-1,046,192	-1,318,532	-256,868	-346,693	-351,668	-307,293
5	- 903,670	- 925,010	155,484	91,379	139,254	143,629
6	- 958,431	- 979,771	100,723	36,618	84,493	88,868
7	- 969,431	- 890,771	194,723	140,618	193,493	197,868
8	- 892,670	- 914,010	271,484	217,379	270,254	274,629
9	- 969,431	- 757,527	285,517	127,312	128,137	132,512
10	- 969,431	- 636,352	397,092	238,887	355,793	360,168

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[5] Assumptions nine and ten assume the 13,000 and 15,000 production levels from year two of implementation. This is equivalent to using mature cows rather than heifers at commencement. Assumed productivity levels in the feasibility studies are conservative giving the studies a degree of credibility they would not otherwise have.

Fluctuations in the labor requirement of 10 percent ($11,000) are not significant to the feasibility of the project; fluctuations of 10 percent ($65,761) in the total feed costs are significant to the feasibility of the project; and fluctuations of 12 percent in milk price are very significant to the feasibility of the project. Combinations of these variations in variable factor prices will tend to offset each other, but the combined effect of 10 percent changes in labor and feed requirements ($76,761) is only about 70 percent of a 12 percent change in milk price.

The Question of Subsidy

The $2.57 Canadian Dairy Commission subsidy on manufacturing milk represents 27.3 percent of the gross return per cwt. to producers. This situation is a reflection of Federal Government agricultural policy. Assumption three in the foregoing sensitivity tests on the feasibility studies represents the cash flow of the Cowdominium without the C.D.C. subsidy of $2.57 per cwt. The result is that the project is not feasible without the subsidy.

There are restrictions on subsidy qualification that are intended to discourage corporate farming (See Appendix F). Attempts are currently being made by the Alberta Department of Agriculture to qualify Cowdominiums for C.D.C. subsidy. Verbal consent has been obtained from high ranking federal officials but confirmation of this has not been received. Final word on the issue is expected within a few days.

Summary

The Cowdominium specified in this chapter is purported to be consistent with Alberta Milk Yard Program (see Appendix G) incentives as follows:

1. It provides farmers an opportunity to utilize centralized facilities and contribute cows, feed and labor.
2. It provides a theoretical basis for improving milk production in Alberta, and
3. It provides for labor flexibility, since one man is not required to be on the job twice a day, seven days a week.

The Cowdominium specified in this chapter also represents a unit which partially or totally solves the basis of the problem listed in Chapter II as follows:

1. Economies of size are realized from the 1,000 cow herd size.
2. Superior management expertise is prescribed.
3. Increased labor flexibility is provided.
4. Increased specialization for farmer participants is included.
5. Per unit costs of production are reduced.
6. An approach to amendment of Government regulation and control is suggested.
7. Ability to adopt modern dairy technology is provided for.
8. Owner-equity problems are solved by converting Cowdominium feed and labor costs into farmer-shareholder income.

The practical application of the theoretical Cowdominium is undertaken in Chapter IV. There are currently three co-operatives in

Alberta actively pursuing large dairy complexes for their areas. The Glen Valley Dairy Co-operative is the subject of this study.

The "Cowdominium" by definition then, is a co-operative arrangement, utilizing farmer and non-farmer resources, to establish and operate a relatively large dairy cow complex. All labor is hired and may be member or non-member, with qualification being a major criteria. Superior management is requisite. All feed is purchased where ever available with price and quality being major considerations. The dairy herd is dry fed with zero grazing.

The cows are managed in herds of 100 - 150 head. The groups are formed on the basis of freshening time and maintained from one lactation to the next. Cow identification for purposes of breeding, D.H.I. and health, must be established and carried on.

Housing facilities are provided on the basis of each herd. Barn units are built to handle 100 - 150 cows with the possibility of a double unit handling 200 - 300 head. Milking parlors are large enough to milk the entire herd in ten hours or less, with standby power and equipment essential. The double herring bone, the carousel and the polygon are the most suitable systems currently available for milking large numbers of cows.

Farmer members are free to continue the operation of their own herds, work for the co-operative, specialize in feed production or retire. It is assumed that there will be some farmers interested in working for the organization, and others interested in specialization in feed production.

The milk produced is sold as either manufacturing or fluid milk and presumably will qualify for the Federal dairy subsidy. The calves produced are culled and sold with regard to herd replacements and the feeding policy of the co-operative.

The "Cowdominium" is primarily seen as a vehicle for providing a feed market and employment for small farmers. However, the capital gain potential is significant as well as profit on operations and any dividends paid would be on the basis of the shares.

The foregoing is a brief description of a "Cowdominium". Further information and details will have to be obtained from the Appendices included in this study.

CHAPTER IV

IMPLEMENTATION

Philosophy

> It is quite all right to talk about 'change' or 'adjustment' when it affects someone else. When it affects us, "it's scary as hell."[1]

The major obstacles to the implementation of the Cowdominium may be other than economic. The challenge of change, both within the individual, and within the institutions man has created, is real, and in many instances almost insurmountable. Insurmountable because of the extreme difficulty that most people experience in attempting to cope with continuing change.[2]

Small dairy farmers who have adjusted to the routine of twice a day, 7 days a week, every day of the year, inherent in the management of dairy cattle are inclined to attempt to carry on as they are until retirement, rather than face major changes in their philosophy and way of life. A calculated approach is needed to attract the interest and attention of small dairy farmers.

Examination of the social implications involved in transforming small independent diversified dairy farmers into specialized dairy laborers and producers of feed and forage, suggests a measure of social change. Social change is defined in many ways. In a general sense, social change means that individuals assume different positions in the social structure and that the positions themselves are subject to change.[3] The important consideration is the element of time.

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[1] Farm and Management Consultants Ltd., Tradition and Transition, (Calgary: Farm and Ranch Management Consultants Ltd., 1970, pp. 2-6.

[2] Small farmers particularly find change difficult. Small dairy farmers are slow to adopt new technology. See Appendix L.

> Social change is brought about by a number of factors - technological, industrial, economic, ideological and religious. No single factor has priority over all others.[4]

From the foregoing sociological insights, it is evident that technological changes in dairying are bringing economic and social pressures to bear upon the small dairy farmer. The decision that must be made by the farmers involved in dairying is whether to wage defensive or offensive action to cope with the pressures. Many farmers for reasons of age, or incapabilities choose the defensive action, which is passive. The alternative to this is a strategy to bring about change in a planned and orderly way, for the benefit of the people involved in the change, and for the society as a whole.

Many sociologists attribute social change to broad impersonal factors within society, or some mystical external influence. Others disagree, as indicated in the following quotation:

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[3] Francis E. Merril, Society and Culture (Englewood Cliffs, N.J.: Prentice-Hall Inc., 1965), p.485.

[4] *Ibid.* p.485.

> . . . social change . . . is basically the work of individuals. Human action . . . is performed by individual human beings. . . . groups and societies do not do anything, individuals playing socially acquired roles are the real actors in the human drama. Hence we must look to individuals for the basic "causes" of social and cultural change.[5]

Martindale continues on to say that it is daring and imaginative innovators in such fields as religion, science, technology and government who are the real agents in social change.

The identification of discreet recognizable steps in social change has been attempted by many sociologists.[6] A general pattern of induced change, tailored to the specific small farmer element resulting from advancing technology, could be the following:

1. Selection of a social setting where an induced change is to be attempted.
2. Presentation of the new idea to the people.
3. The emergence of the progressive few.
4. Organizational requisites to pursuit of the idea, i.e., steering committee and legal co-operative.
5. The local commitment.
6. Determination of government policy by presentation of test cases.

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[5] Don Martindale, Social Life and Cultural Change (Princeton; D. Van Nostrand Co. Inc., 1962), p.59.

[6] George P. Murdock, "How Culture Changes" in Life in Society, ed. Thomas E. Lasswell, John H. Burma, Sidney H. Aronson (New York: New York University, Scott Foresman and Co., 1965), p.52.

7. The culmination of local commitment and government policy. Result, Alberta's first Cowdominium.

The challenge at this point for inducing social change as implied in the Cowdominium is to start the process by initiating the first step. The first step is the selection of the social and geographical setting where the induced change is to be attempted. The obvious elements necessary in this selection are the existence of the small dairy farmers facing elimination; an existing or potential market for the increased milk production; an atmosphere of co-operation in the attitudes and experience of the people involved.

Public meetings on the subject of dairy cow co-operatives have been held at several locations throughout the province in the past year. The following observations are made with respect to Glenwood, Alberta as a designated location to attempt induced social change in the context of a Cowdominium.

1. A survey conducted in 1972 in the Glenwood area indicated the presence of 40 - 50 small dairy farmers.

2. In 1973 a modern new cheese factory was constructed at Glenwood with a capacity sufficient to accommodate an increase in milk production of 500 percent.

3. The new cheese factory at Glenwood was built by a farmer co-operative which has been in existence since 1941. Its successful operation through some difficult years, due to milk shortages and poor cheese markets, is evidence of local co-operative philosophy and capability. The Cardston Co-operative Creamery has also operated for a number of years as a co-operative.

Another, possibly unique, form of co-operation which originated and has been operational in the area for more than forty years is the Cardston Clinic. This is an arrangement amongst subscribers to the program whereby the services of medical doctors have been made available to all participants in exchange for the payment of a nominal annual fee. It is a type of medicare; co-operation is its fundamental concept of joint effort to satisfy individual need, which otherwise would not be readily available. There have been other co-operative endeavors in the area including a major irrigation project and a co-operative store. The latter was operated by the co-operative cheese factory and failed due to poor management and lack of patronage. This failure may be seen as a valuable experience in the history of the people of this area, they having learned from their experience.

On the basis of the foregoing, Glenwood was selected as an appropriate sight at which to approach the people with the Cowdominium idea.

Implementation of Theoretical Cowdominium

In accordance with the theory of induced social change, the idea of the large dairy co-operative for the Glenwood area was presented to a few local people, selected for their progressiveness with respect to acceptance of new ideas. This approach was made to three persons on an individual basis in August of 1973. By October of 1973 there was sufficient interest to call a general public meeting to pursue the matter further. There were thirty people present at the October meeting, including fourteen farmers, ten urbanites and six government specialists.

Presentations were made by the various specialists which included theoretical, economic, technological and social implications of the cow complex. The decision of the group present at the meeting was that the matter warranted further study. A steering committee and a legal co-operative were organized under the direction of a Co-operative Activities Specialist of the Alberta Department of Agriculture, who was present at the meeting. The directive to the President and Board Members was to arrange for a feasibility study to be carried out as soon as possible. See Appendix S.

The feasibility study was provided by a Government Regional Economist and within the limits and assumptions of the study, the opinion of the Specialists and the preference of the local people was that a 1,250 cow dairy co-operative for the Glenwood area was feasible and desirable. Not much was accomplished from August to October. In spite of the studies and the positive decisions the local group was fairly blasé. In February of 1974 there appeared to be a change of attitude toward the project. A new president was elected.

The two major considerations at this point were the extent to which local financial and other commitment could be enlisted, and the determination of specific government policy on the cow complexes. The executive of the Glen Valley Dairy Co-operative felt that it was necessary for them to make a tour of similar operations in Utah and Arizona, for the purpose of examining existing facilities and interviewing persons involved in such projects. A tour was proposed by them as part of a total interim proposal to the Government on the establishment of a Cowdominium at Glenwood. The interim proposal was accepted by the Government and in March, 1974 the tour was made by nineteen people; four of whom were from Glenwood.(See Appendix M and Appendix T) In addition to the information gained from the tour, the fact that small dairy farmers were able to view the operation of large dairy farms (some as many as 3,000 cows) was of great importance in the general acceptance of the small farmers to the proposal to manage in excess of 1,000 animals in one operation. The Glenwood group was now in a position to promote the idea in the area and solicit the local financial commitment through the selling of shares and other local liabilities that would be required. See Appendix U. The Glen Valley feasibility study and organizational by-laws were all in accordance with a document of General Considerations and Suggested Policy (See Appendix P), which outlined current stated government policy relative to Cowdominiums.

On the basis of the feasibility study, the Utah-Arizona tour and stated Government Policy the President and Board Members of the Glen Valley Dairy Co-operative launched a share selling campaign in the Glenwood area and in a period of months were able to enlist sufficient local financial commitment to proceed further with the project. (See Appendix V). The monies collected from sale of shares have been placed in a Trust Account and are drawing interest.

The next step in the process was for the Glen Valley Dairy Co-operative to make a proposal to the Agriculture Development Corporation, including an application for sufficient funds to finance the dairy co-operative, all in accordance with stated current government policy. This application and proposal was forwarded to the Agriculture

Development Corporation through the Dairy Commissioner on June 11, 1974. (See Appendix N). A decision by the Corporation is awaited. The culmination of adequate local commitment, consistent with current government policy should result in the establishment of a Cowdominium at Glenwood in the near future. Presumably, if approval is granted by the Corporation to proceed, the general guidelines of the hypothetical model in Chapter III will be followed.

The question of Canadian Dairy Commission subsidy quota is crucial to the prospects of Cowdominiums. The feasibility studies include the subsidy which means that without subsidy the cow complexes are not feasible under present government policy. Efforts to gain approval by Canadian Dairy Commission for the dairy co-operatives are currently being made and any affirmative decision by the Agriculture Development Corporation is completely dependent on approval from Ottawa on the subsidy eligibility question. The time element is becoming very crucial because the shareholders want their money back if the project does not become a reality in the near future.

The Glenwood proposal to the Agriculture Development Corporation includes copies of applications from prospective managers, relatively well trained and experienced. They are mainly local men, with the exception of one from California applying for the position as General Manager of the Co-operative. His academic qualification and experience is very attractive, and the social implications of his being hired are not serious, since his background and orientations are similar to those in the Glenwood area.

The specific location of the Cowdominium should be in accordance with the following priorities:

1. It should be located central to feed sources.
2. It should be located as near to the milk market as possible.
3. It should be located on well drained, sandy soil of low productivity.

As of this date, (October 9, 1974) the progress of the implementation of the Glen Valley Dairy Cowdominium is stalled awaiting the decision from Ottawa relating to the federal dairy subsidy. If approval is granted the following is a step-wise procedure for further implementation of the Cowdominium:

1. Final clearance and approval from the Agricultural Development Corporation and the establishment of the sources of credit is necessary,
2. Hire an experienced, academically qualified manager with proven ability. Regardless of who is hired, an on going inservice training program is essential.
3. Purchase one half section of land suitable for a Cowdominium.
4. Finalization of building plans, specifications, and lay-outs with architects and Department of Agriculture engineers is necessary.
5. Consideration of types of equipment to be installed and consultation with suppliers of equipment.
6. Open tenders on buildings and equipment. Acquire necessary feed supplies.
7. Hire other help as required. Farmer-members should be given consideration.

8. Commence the accumulation of the dairy herd by purchasing high quality open dairy heifers.

9. Provide accommodation for the heifers, either temporary or permanent, until the regular facilities become available.

10. Let the contracts for building construction and equipment - breed the heifers A.I. to high quality dairy sires. An effort should be made to distribute the freshening dates of the heifers over a six month period of time.

11. Close scrutiny of all aspects of construction and equipment installation will be necessary to ensure adherence to specifications and effect any alterations that may be deemed necessary.

Timing and co-ordination will be of utmost importance in this implementation procedure. Sufficient lag time must be provided in the construction to avoid having to expose the herd to other animals in the area, through temporary joint use of milking parlors, pasture or housing. In view of availability of equipment and supplies experienced recently extreme care will be required.

This chapter has treated the implementation of the hypothetical model in a particular area. Alternative possibilities, unexpected problems and beneficial spin-offs, and some of the social ramifications will be discussed in the next [illegible]pter.

CHAPTER V

OPERATIONAL CONSIDERATIONS, THEORETICAL IMPLICATIONS AND IMPLEMENTATION ALTERNATIVES

Operational considerations will include aspects of the dairy co-operative in the Glenwood area and will deal with the social and industry sectors; theoretical implications will include economies of size, specialization, and the effects of various interest rates on the feasibility of the proposal; and implementation alternatives will consider alternative cattle procurement and share base possibilities.

Operational Considerations

The social structure of the immediate Glenwood area is relatively homogenous and rural. The social life is centered in the predominant church of the region, The Church of Jesus Christ of Latter Day Saints (Mormon). There is one service club and various other non-church-sponsored elements in the area but they are of marginal significance to the social fabric.

Generally speaking, membership in co-operatives is open to everyone; but in practice certain patterns in membership composition develope. These patterns are usually a reflection of the beliefs and philosophies of the people. For example, the Weavers Co-operative in Rochdale, England in 1844 was made up of weavers who had been exploited by middlemen. The membership had at least two things in common -- they were weavers, and they had been exploited.[1] The organization of the Rochdale Co-operative was a result of the belief of the weavers that they did not have to be subjected to the exploitation of middlemen.

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[1] G. W. Foster and M. C. Leager, Elements of Agricultural Economics (New York: Prentice-Hall Inc., 1950), p.262.

In Canada, experience with co-operatives has been successful. Farming co-operatives in Saskatchewan are numerous. In 1958, out of a total population of 888,000 there were 663,327 people belonging to co-operatives.[2] At this time co-operatives were at a peak in Saskatchewan, however, the ratio between co-operative membership and total population is inflated,since many people belonged to more than one co-operative. Extremely successful co-operatives have existed and are flourishing in the Maritimes, in Quebec and Ontario, and to a lesser degree in Manitoba, Alberta and British Columbia.

A basic philosophy which is instrumental in the patterned co-operative membership is whether a man should work hard and save for the future, or whether he should live life to the full at present and not worry about the future.

> Complaints that certain individuals are slack on the job while others work conscientiously may often be reduced to this difference in perspective on how hard a man ought to work. [3]

It appears that the membership of particular co-operatives, if not socialized prior to being organized, undergo a sort of "purification" as to the predominant philosophy that is to prevail. This purification is a resolution of the "eat, drink and be merry" philosophy and the "Protestant work ethic."

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[2] Alvin L. Bertrand, ed., Rural Sociology: An Analysis of Contemporary Rural Life (New York: McGraw-Hill Book Co., 1958), p.307.

[3] Henry Cooperstock, "Prior Socialization and Co-operative Farming," Canadian Society Sociological Perspectives, Bernard R. Blishen, Frank Jones, K. D. Naegele and Joh Porter, eds. (3rd ed.; Toronto: Macmillan of Canada, 1968), pp. 337-344.

In the ecclesiastical history of the people in the Glenwood area there is a basis for their co-operative inclinations. From 1830 to 1850 the Mormon people were subjected to extreme persecution and ridicule. Their principal means of survival was by co-operating with each other as is illustrated in the typical circular formation of the wagon train camped for the night on the trail west. There was also an economic system of stewardship known as the United Order which combined elements of socialism and capitalism, the result being a levelling of social classes while maintaining the incentive to be productive. This system was attempted in the 1830's but it failed for reasons notwithstanding the system. Finally, the "long-run," in Mormon philosophy is eternity. All other time dimensions and value systems are in terms of the "long-run." Materialism is strong and deterministic in Mormon philosophy and behavior, but it is nevertheless secondary to "eternal" values. This unique mix of religious philosophy and materialism is probably a factor in the demonstrated ability of the Glenwood people to co-operate.

Industry

If three 1,000-cow dairy co-operatives were established in Alberta, their combined production per year would be approximately 36,000,000 pounds of milk. This is 2.5 percent of the 1972 total milk production in the Province. In a setting of decreasing cow numbers and milk production, with continuing strong demand for milk and milk products, an increase in milk production of 2.5 percent would be desirable. To equalize the decline in 1972 milk production from 1971 would have required five 1,000-cow co-operatives, and similarly the decline in 1972 milk production from 1967 would require twelve cowdominiums for equalization.

Some objection to dairy co-operatives has been voiced by farmer organizations, by commercial dairy farmers and by government officials representing the Family Farm Division. However, when explanations are made in relation to corporation farming, to the fact that the dairy co-op concept is not the only alternative open to the marginal farmer, that it is not being proposed as a panacea for all dairy farmers, and the rationale for inclusion of non-farm people to a limited degree as shareholders, the opposition to the concept from these quarters is somewhat tempered.

Potential savings in hauling charges for milk are considerable when the tanker truck is able to obtain a full load at one stop. This would be the case at the Cowdominiums. The alternative to lower freight charges in this situation is an increase in the distance the milk may be economically transported. This fact bears on the decision of location of the Cowdominium in relation to the market.

Theoretical Implications

The predominant trend in farm size is toward the higher gross income farm, where economies of size exist and may be realized. Statistical information released recently by the U.S. Government indicate the following trends:

1. In 1973, 109,000 super farms (i.e., 3.8 percent of total farms) with gross sales of more than $100,000 annually produced 45 percent of

the nation's food and fibre.

2. In 1973 753,000 small farms (i.e. 26 percent of total) with gross sales of less than $2,500 annually, produced one percent of the nation's food and fibre.

3. In 1972, there were only 70,000 super farms compared to 109,000 in 1973 (Note: inflation is a factor here, as well as trends in farm size).

4. In 1973, the number of farms in the $20,000 to $100,000 gross annual sale range increased from 700,000 to over one million.

5. In 1973, the number of small farms in the $2,500 to $20,000 gross annual sale range decreased from 1,159,000 to 1,082,000.

Pecuniary economies of size available to the large dairy production complex would be in feed and supplies procurement. There would also exist a degree of market power, where having 40,000 pounds of quality milk available at one pick-up every day may provide some leverage for entry into the fluid milk market. Under regulations and philosophies presently operating, oriented to meet the needs of small farmers, the realization of any degree of market power may be logically doubted. However, as milk production continues to drop, government and society must accept the realities of the commercialization of milk production and the necessity to modify agricultural policy. This modification of agricultural policy will have to be in the following terms of reference: the preservation of the family farm, this being stated government policy, but within economic relevancy. This may be accomplished through providing opportunities for families to remain associated in primary agricultural production in agricultural production units which are viable.

The diseconomies of size existing in the 1,000-cow dairy co-operative would be directly associated with management and its limitations. The trend in farmer-operated dairy farms in the U.S.A. is toward the 400-cow level and in commercial dairies the trend is toward the 2,000-3,000-cow level with management and specialization, respectively, being the determining factors.

Specialization

There are theoretically two different and separate returns from specialization. The first is in the time dimension, wherein each person spends more time doing that which he is more capable of doing; the second is in the capability dimension, wherein as specialization occurs, the capability and expertise of each person increases as a direct result of specialization. There are limitations to gains realized from the latter, in that extreme specialization may result in boredom. An in depth study and analysis of the potential gains from specialization in the Glenwood case is not possible here. However, on the basis of an informed guess[4] a calculation of the gains that may be expected from specialization in the Glenwood situation follows.

In the implementation of this model in the Glenwood area, it is assumed that:

1. Six dairy farmer shareholders will cease their dairy and farming operations and will work full time for the co-operative.

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[4] Information obtained by personal interview with some of the shareholders and other people in the area.

2. Three non-dairy farmers who are shareholders will work full time for the co-operative.

3. Eight non-dairy farmers who are shareholders will specialize in the production of feed for the co-operative.

4. As a result of specialization increased milk production per cow per day will be ten pounds.

5. As a result of specialization increased forage production per acre per year is one ton.

6. Farmers specializing in feed production only utilize half of their land holdings in this way, giving a total of 4,720 acres.

7. The equivalent of the ninety-seven cows sold by the members is placed in the dairy cow producing herd. See Appendix V.

Annual gain from specialization in the handling of 97 milk cows is (97 x 10 x 330) = 320,000 pounds of milk at $9.41 per cwt. is (3,200 x 9.41) = $30,112. Annual gain from specialization in feed production on 4,720 acres is (4,720 x 1) = 4,720 tons of hay at $60 per ton is (4,720 x 60) = $283,200. Total dollar value of gains from specialization is (30,112 + 283,000) = $313,112 annually. These are theoretical gains but are realistic in view of average milk and feed production levels in Alberta.[5] Total dollar value of the theoretical gains from specialization in just the production of milk and feed in the Glenwood area is significant. They represent an average of (313,112 ÷ 17) = $1,842 each for the seventeen farmers who specialize.

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[5] Average annual milk production per cow of Alberta's 178,000 dairy cows was just under 8,000 pounds in 1973. The same figure for cows on the D.H.I. program in Alberta for 1973 was over 12,000 pounds. Further, it can be noted that pasture and forage production in the area is low per acre, particularly in view of the irrigation services available.

Interest Rates

> High interest rates will place unreasonable demands on the production earnings of any agricultural enterprise; most agricultural enterprises require a land base and therefore will have a substantial portion of total investment financed at reduced government rates (A.D.C. direct loan at 7 percent).
>
> This enterprise requires a large investment to form a dairy herd which will retain its value (similar to land) throughout the life of the project; therefore, it would be reasonable to consider the same financing on a herd as on land.[6]

There are two issues considered in the foregoing quotation:

1. The rate of interest, and

2. The policies relating to the term of the loan and that which is being purchased.

The present rate of 11-12 percent interest on borrowed capital is more than can be paid by the productive capacity of a beginning co-operative. Therefore some early subsidization of beginning co-operatives is necessary.[7] This cost to Government may be justified by a consideration of the aggregate benefit of the Glen Valley project to Alberta. Some of these benefits are: See Appendix P.

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[6] See Appendix P.

[7] According to Foreign and Commonwealth Office, Overseas Development Administration, A Guide to Project Appraisal in Developing Countries (London: Her Majesty's Stationery Office, 1972):

> The necessity for subsidies may also have implications for the financial management of the investment since arrangements will be needed to ensure that the way in which they are provided does not undermine any financial objectives which are set to ensure efficient management.

Sufficient local commitment and involvement has been provided for in the Glen Valley Co-operative proposal so that the threat from faulty subsidization is minimized.

1. Additional yearly agriculture revenue.
2. Effective increase in value of provincial gross production.
3. Direct return to province (taxation).
4. Additional revenue and benefit.

The assumptions implied are:

1. Feed consumed is in addition to current level of production in Alberta.
2. There is a multiplier effect of 3.5 to 1.[8]
3. Assumes 10 percent net taxable income at a 20 percent rate.

The $40,000 annual tax benefit combined with the increase in provincial gross production and agriculture revenue may be viewed as partial justification and financial resource for the early subsidization of beginning co-operatives. The benefits accruing to the province will continue after the period of subsidization.

Financing

Presumably in three to four years, the bank interest rate will drop to the 9 percent level used in the Glenwood proposal, or alternatively, in three or four years the cost-price structures in the dairy industry will be such that a higher rate of interest can be paid by the co-operative. Inasmuch as the proposal calls for deferred principle and interest payments in the first three years, the equity position of the shareholders will only be increasing on the basis of inflation and the feeding efficiency of the co-operative, not on the basis of retired principle.

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[8] Only the multiplier effect of milk produced considered here. Effects of equipment, building materials, veterinarian services and other such items are not included.

The policy of most money lending institutions, principally banks, to grant long-term loans (twenty years) on land and buildings and short-term loans (ten years) on cattle, requires an intensive review by regulatory agencies and the institutions themselves. Since buildings depreciate while the dairy herd is a self-perpetuating unit and may even appreciate over time, logic would dictate a reverse of the traditional lending policy. Risks such as death in the herd can be covered, just as fire insurance covers the risk of fire in a dairy barn. This policy of granting only short-term loans on cattle is deeply ingrained into the tradition and philosophy of money lenders and will require considerable effort in dislodging it.[9]

Short payback periods will result in a distribution of profit with high gain in equity but a negative cash flow. Ten-year terms and present interest rates will result in a negative cash flow of approximately $150,000.

A Guide to Project Appraisal in Developing Countries[10] suggests four considerations in making a cash flow analysis on a project. Development is relative, as a result these guides have application in Canada, a developing country. Briefly stated, they are:

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[9] The Dairy Team at Utah State University in Logan, Utah has been instrumental in forcing the money lending institutions in the U.S.A. to look at this situation. Money for such projects in the U.S.A. is much more difficult to obtain than in Alberta.

[10] Foreign and Commonwealth Office, Overseas Development Administration, _op_. _cit_.

1. The appropriateness of the financing structure should be considered in the light of the riskiness of the investment.

2. The analysis should be conducted in terms of the expected values and the effect of the likely deviations from these values upon the sources of capital.

3. Specifically, the ratio of loan to equity capital may have to be lower for a risky project if liquidity problems are to be avoided.

4. A sensitivity and risk analysis in terms of cash flows is needed.

A brief discussion of each of the four items follows:

1. On the matter of risks involved in the investment in the Glen Valley Co-operative proposal, it may be correctly asserted that the risks are pooled almost to the extent that uncertainty is eliminated.[11] The costs of production are mainly feed, labor and interest on investment. The feasibility study is based on a relatively high feed price with the expected and actual long-term average somewhat lower than the $50 per ton used. Further, feed will be purchased from the field and by contract as much as possible. The fact that the district has irrigation reduces the risk of crop failure. Labor costs

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[11] Paul A. Samuelson and Anthony Scott, Economics (2nd ed.; New York: McGraw-Hill, 1968), pp. 679-680.

and interest on investment may be expected to fluctuate directly with inflationary trends, which, in turn, may be expected to correlate fairly closely with fluctuations in the price of milk.

The revenue for the co-operative is mainly from milk sales and calf and cull cow sales. The extent of government regulation and control in the milk industry has in the past been sufficient to ensure a reasonable return to average milk producers,[12] and it may be expected that in the future the supply management and formula pricing policies of the control agencies will be able to continue to provide this stability in the marketing of milk. The income from calf and cull cow sales is not too significant in this regard. If the dairy opts to feed out the steers, then this revenue would have a greater bearing on the situation.

2. Calculations showing the cash flow position of the dairy co-operative over a seven-year period with variable interest rates and time factors is provided in Appendix P. 'Proposed Financing' on the basis of two alternatives is indicated. Any deviation from this position in terms of higher interest rates and/or shorter time periods would result in negative cash flow which would require more operating capital in the short run.

Fluctuations in feed prices will produce an effect on the cash flow similar to those of lower and higher interest rates. Stockpiling required feed in the summer and at harvest time is an effective hedge against high winter feed prices.

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[12] Canadian Dairy Commission supply management policies. Anticipated formula pricing. Lethbridge, Calgary and Edmonton, Dairy Farm Business Summaries, Alberta Department of Agriculture, 1970-71-72.

As stated in item one, the relative stability of the milk price under the controlled market system that exists in Canada and Alberta reduces the risk from fluctuations in this expected value. The productivity of the herd is a crucial factor here, but the average yields used (10,000 - 12,000 pounds per head) are average and less than average and barring any major mismanagement or disease problem, the realization of these production levels is assured.

The effect of the likely deviations of the costs of the inputs and the prices of the outputs upon the sources of capital will not be too serious because 80 percent of the original capital is through a government guaranteed loan, so that the government, as the regulatory agency of milk prices, will have an added incentive to maintain a cost-price structure in the dairy industry that results in viable milk producing units.

3. As explained in item one, the Glen Valley Co-operative proposal cannot be considered risky in the normal sense of the word, assuming top management. However, the matter of the ratio of loan to equity capital is an area of legitimate concern. As stated previously in this paper, the average fluid milk producer in Alberta is receiving only reasonable interest on investment and a rather low wage rate for his labor.[13] His net return in excess of this is

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[13] Compare farmer prescribed wage rates of $5.00 per hour in C.R.D.'s done in the Province with $319.48 per month in the 1971 Edmonton Dairy Farm Business Summary, which is approximately $1.50 per hour.

marginal and sometimes even negative in some areas of the Province. Therefore, on the basis of the foregoing, if a farmer has low equity in the unit and then hires all labor, his return is very low because his equity is low and the labor requirement is a cost to him. The way in which the dairy co-operative concept deals with this problem is that labor return is paid to the marginal farmer shareholder who originally opted to work for the co-operative. The other marginal farmer shareholders have specialized in feed production so that their income is the co-operative feed costs. In these ways, the marginal farmer survives the early years in the co-operative and lives to reap the capital gain benefits along with the other investors in the co-operative in the succeeding years. On this basis, the relatively low equity position of the co-operative is justified and feasible.[14]

4. In each case, from the theoretical model to implementation of the model, a sensitivity and risk analysis in terms of cash flow is provided in the Appendices and in Chapter III. The price of feed, labor, milk and the interest rate are the areas of price deviations looked at and the alternatives are worked out.

Implementation Alternatives

Cattle Procurement

It is possible to accumulate a herd of 1,250 dairy cows by purchasing mature cows. Some of the advantages are:

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[14] Note treatment of the subject of equity level and farm labor in relation to farm income in Chapter II.

a. early production and revenue from the herd,

b. possibly lower early cull rate, and

c. possibility of obtaining proven producers.

Some of the disadvantages are:

a. higher initial capital cost ($330,000 in the case of Glen Valley Dairy),[15]

b. an older herd in three or four years than with the heifer route,

c. disease problems,

d. mastitis,

e. difficulties in determining production levels of non-tested cows, and

f. social and retraining problems with older animals.

A combination of both the heifer and the mature cow route may be used, in which case there would be a combination of all the advantages and disadvantages of both systems.

The traditional commercial dairy herd in Alberta has been comprised of 40-50 cows with a few enterprising producers reaching the 100 and 200-cow level. As a result, there is a tendency on the part of farmers, specialists and politicians, when considering Cowdominiums, to be a little conservative and to prefer an initial 500-cow herd. This apprehension may be justified in terms of management expertise, but economically it does not prove reasonable. The feasibility studies[16] have shown that a 500-cow herd is not large enough to justify minimum management and labor requirements, and its growth would be conditional upon the injection of more capital at a later date. A 500-cow herd is analagous to flying slowly close to the ground so as to avoid danger.

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[15] See Appendix S.

[16] See Appendix O.

The distinguishing feature of the Cowdominium is the one man - one vote policy of all co-operatives. Other than this, the proposed Glen Valley Dairy Co-operative is a corporation in the sense that all dividends will be paid on share capital or loan certificates. Interestingly, past experience at meetings in Alberta has been that the commercial dairy farmer and the urbanite are much more interested in the dairy co-operative concept than is the small farmer.

There are other important and relevant social and economic implications and issues bearing upon the Glen Valley Dairy Co-operative proposal to the Provincial Government. However, the main thrust of this paper is the hypothetical model and its implementation.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The main objective of this study was to explore some of the economic and social implications involved in pooling the resources of dairy farmers with a view toward increasing total milk production and encouraging the preservation of the family farm. Milk production in Canada and Alberta is decreasing at an increasing rate. The number of people involved in primary agriculture production is also on the decline. Any action that will reverse one or both of these trends without unreasonable social or economic costs must be worthy of serious study and consideration.

The concept of the Cowdominium is an attempt to increase milk production through improved management of dairy cows, and to provide an opportunity for dairymen to remain associated with dairy production and to enjoy improved working conditions and returns for their labor. Potential gains from specialization provide the increased revenue to effect such improvements in production and labor return.

This idea is not original. It is new only in terms of the time and location factors. Co-operative farms and cow pools have been tried in many areas over a period of many years with varying degrees of success. A review of the experience of others has provided insights which have been utilized in this study. Some of these insights into this experience include the reality of the heretofore suspected economies of size in dairying; the extent of the management constraint, the benefits accruing from the involvement of non-farmer members in a cow co-operative (e.g. accountants, lawyers, veterinarians), that rural development initiatives are complimentary to the Cowdominium concept, the possibility of hiring women to work in the milking parlor, the need to let the manager manage without undue interference, the indirect benefits of a large dairy complex to the district in general, and the questionable rationale employed by lending institutions with regards to the restriction of short-term loans on cattle. These insights provide the tools which regulatory agencies may use in efforts to influence economic and social trends.

An analysis of the trends in dairying with respect to cows, milk and farmers, enables the economist to study and expose some of the principle moving factors responsible for the trends. Some of these factors are: the excessive demands on management of diversified dairy farming; the high capital cost of technological advances in dairying requiring substitution of relatively large amounts of capital for the farmer's labor for which he currently receives a poor return,[1] the twice a day, seven days a week, fifty-two weeks a year labor demands of one man dairy operations, and the fact that small cream separators and milk cans are becoming extinct.

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[1] The general rule of expanding capital where the labor saved is equal to or greater than the amortized cost of the capital is valuable only when there is high utilization of the capital investment. In the case of the small dairy farmer, he is caught in a trap -- not being able to milk his own cows for a comparable return for labor offered in the Cowdominium. For example: In the 24-point polygon milking parlor one man milks 140 cows per hour. If that man earns $4.20 per hour, then the labor cost of milking one cow is 3 cents. With two conventional milker units, one man can milk 30 cows in two hours. At the polygon labor rate he would earn 45 cents per hour for his labor.

As Governments attempt to influence economic trends in society, there are social costs to be considered. Many times they are prohibitive and thus social and political considerations sometimes influence the agricultural policy of governments as much or more than the economic facts.

Cowdominiums provide for the maintainance of a viable dairy production unit with a minimum of social cost. In fact, for the people involved, there may be no social cost since the program is entirely voluntary. If farmers who otherwise might lease or sell the farm remain involved in primary agriculture production, and if in the middle-run (i.e., five years) they are better off than if they had leased or sold, then the social cost has theoretically been zero.

The model Cowdominium is a co-operative made up of twenty shareholders and 1,000 cows. A $20,000 shareholder liability is required. Ideally six of the farmer shareholders will liquidate their dairy herds and work full time for the Co-operative. Their land will be leased or sold to six other dairy farmers who liquidate their dairy herds to specialize in feed production. The balance of the shareholders remain as they are.

The 1,000-cow herd is organized by purchasing open dairy heifers from high producing stock. The heifers are then bred to the best available bulls by artificial insemination. The buildings and facilities are erected and assembled during the heifers' gestation period. All buildings and equipment must incorporate the latest technological advances.

The herd will be dry-fed the year around with feed testing, feed costs and cow productivity being deterministic in feed formulation. All feed is to be purchased during the summer and harvest seasons. Scientific feeding related to genetic capability of the cows is requisite.

Superior management is of utmost importance to the success of the Cowdominium. Since this quality of management is not readily available in Alberta importation of a manager, or extensive training of local people will be necessary. The manager must be allowed to manage with no interference from co-operative members directly or indirectly. Managers must be free to manage the Cowdominium within the policies set by the Board of Directors. An appropriate input from government would be in the selecting and training of managerial and supervisory staff for Cowdominiums.

While Government regulation and control in the milk industry has provided stability in the marketing of milk from both a producer and consumer point of view, in terms of both price and supply, the effect has been to discourage the more efficient producer and encourage and maintain the less efficient producer. This has been the result of restricted and relatively small quotas and guaranteed margins. A slackening of that control by facilitative legislation and accommodation favoring the larger, more efficient producer will provide additional market power to the dairyman which he may use for his own direct benefit with an indirect benefit to the consumer.

In each item discussed in this summary, the dairy co-operative concept has provided a theoretical basis for at least a partial resolution to the basic problems facing the small dairy farmer.

Ironically, it is not the small dairy farmer who is most interested in and attracted to the co-operative.[2] It is the commercial farmer and the urban investor. Unfortunately, typical small farmer reaction to the idea is one of suspicion and he sees it as merely a way for the non-farm investor to share in the profits.

Direct and Indirect Costs and Benefits of Cowdominiums to Society and the Farmer

Direct costs of Cowdominiums to society and the farmer are approximately $2,000,000 capital cost per Cowdominium, approximately $200,000 per unit for interest subsidization, the necessity for people to change in a particular way and the loss of some managerial freedoms by small farmers involved.

Direct benefits of Cowdominiums to society and the farmer include increased annual total milk production in the province, a higher standard of living for farmers who specialize, a significant capital gain for all shareholders, $1.1 million additional yearly agriculture revenue and $3.9 million effective increase in the value of provincial gross production.

An indirect cost of Cowdominiums to society and the farmer is that sons of farmers working for the co-operative who wish to become involved in primary agriculture production will not have equal opportunity to do so, had they been directly associated with farming.

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[2] This conclusion drawn from the reactions of people at meetings held throughout the province during the past year.

Indirect benefits of Cowdominiums to society and the farmer include effective annual increase in value of provincial gross production of $3.9 million, a direct return to the province of $40,000 annually in taxes, the involvement of urban and rural people in a joint project, an improved market for feed grains and forage produced in the area-some aesthetic value, and the value as an applied research project.

Conclusions

Assuming that Cowdominiums will qualify for Canadian Dairy Commission subsidy, several of these units may be built and in production by the end of 1975. If Canadian Dairy Commission approval is not granted, there will be no such reality, unless additional subsidization is provided from some other source.

Unfortunately, it cannot be expected with any degree of assurance that the small dairy farmer will become involved in these projects to any great extent. For a dairy farmer over fifty-five years of age there is a tendency to try to survive for as long as possible without major change in capital invested or life style. This attitude is certainly rational and cannot be seriously questioned from either an economic or social point of view.

The expected make-up of the shareholders of Cowdominiums will vary from place to place but, in a general sense, the following may be forecast:

a. 50 percent commercial farmers,

b. 30 percent non-farmers (or higher if permitted by Government policy, and

c. 20 percent or less small dairy farmers.

In view of the acute fluid milk shortage in the larger Alberta centres, the attainment of Canadian Dairy Commission subsidy quota may be pursued in another way. Responses to several phone calls to Edmonton dairies indicate that they would be extremely interested in obtaining the rights to 40,000 pounds of milk per day, and that fluid quota for a significant portion of that milk could be anticipated. With graduated entry commencing in January, 1975, the possibility of obtaining sufficient Canadian Dairy Commission quota to supplement a fluid quota for a Cowdominium appears to be significantly enhanced, as some of the traditions give way to rational thinking.

A second bastion of tradition that needs to be assaulted if Cowdominiums are to become a reality, is the policy of restricting loans on cattle to the short term. The Provincial Government could act as an innovator here and through the facilities of the Agriculture Development Corporation grant long term loans on livestock.

It is trite to say that more research is needed before further conclusions may be drawn. In the case of Cowdominiums however, more research is not needed before Pilot Projects can be initiated. In fact such projects may be one of the few methods of doing more research and gathering more information on the Cowdominium concept.

Some insights gained in this study are:

1. That the agriculture industry needs to consider more emphasis on its own specialization. There is the feed production sector which produces feed of all kinds from the land for both man and animals, and there is the feed processing sector composed principally

of livestock production. Accurately described the two sectors may be considered as primary industry and secondary industry respectively. Note: An attempt was made to qualify Cowdominiums for grants from D.R.E.E. (Department of Regional Economic Expansion, Ottawa) implying that the Cowdominium is secondary industry i.e., feed processing. The attempts failed.

2. That economies of size in the mechanized parlor milking of dairy cows are such that a small dairy farmer cannot economically milk his own cows.

3. That potential benefits from the involvements of non -farm shareholders in rural projects do exist.

4. That possibilities of involvement of women in the management and labor force exist.

5. The extent to which the influence of one man is deterministic in the success or failure of an activity was illustrated.

6. The urgent need in Alberta for the organization of a "Dairy Team" of Specialists from the Department of Agriculture similar to the one at the Utah State University in Logan, Utah. The successful initiation and correlation of Cowdominiums in Alberta is largely dependent upon a major input relating to technology from Governmental agencies.

The desperate need of the small dairy farmer fighting for survival, combined with current Government policy of preservation of the family farm in a viable agriculture, should produce a Cowdominium. Barring this possible development, the threat of further vertical integration in milk production, processing and distribution is increased significantly.

EPILOGUE

I was raised to my twentieth year on a mixed farm in Southern Alberta. Father kept dairy cows until his last son left home for greener pastures. We shipped cream to the local Co-operative Creamery, then later on we shipped milk to the local Co-operative Cheese Factory.

It was my ambition to be a farmer, therefore I did not plan for more than a High School education. One didn't need to go to school to be a farmer, so I reasoned. Since I was the eldest son in the family, I was ready to go farming with Father, before the family was raised and since the farm was not able to accommodate two families, I had to leave home. I took a job in the cheese factory.

As I washed cans and made cheese, I pondered my predicament with the limited understanding I had of the forces that landed me, a potential farmer, in a cheese factory.

During eight years in a cheese factory and twenty years with the Provincial Dairy Branch, I have had constant and cross-sectional contact with dairy farmers of all sizes and kinds. The people in transition particularly interested me because I was able to explore their thought processes in their decision making. Small dairy farmers are typical marginal farmers, a result of their staying power in the face of economic pressures. There has always been a return to labor in dairy.

Questions of the need for unity in the farm voice; the lack of farmer market power; land tenure; farmer operational efficiency; production costs; and economies of size and scale were always at the basis of my discussions with dairy farmers in transition.

My youthful folly soon overtook me with regard to my educational qualifications. Classification demands in government service soon forced me to consider ways of increasing my earning power. The most feasible alternative was to increase my educational qualifications.

I commenced a schedule of classes which brought me a Bachelor of Science in dairy science and economics, in four years. In the next two years I completed course work for a Master of Science degree in Agricultural Economics. For the last two years I have been thinking about and working on a Thesis, The Cowdominium.

In June, 1973, the Alberta Government circulated their Alberta Milk Yard Program 'White Paper' in the Department of Agriculture. I was delegated to develop a model within the policies of the White Paper. I have been closely associated with the development of Government policy on Cowdominiums, the tours to Utah and Arizona, the twelve meetings that have been held with different groups throughout the province and with the proposals to the A.D.C. from the groups at Glenwood, Vauxhall and St. Paul.

I consider the issue of the Alberta Milk Yard Program to be opportunity in its most challenging and timely form. My work and involvement in the Cowdominium concept represents the realization of an ambition I have had since I left my father's farm. My ambition was to do something to help the marginal farmer help himself. The Cowdominium provides that opportunity within terms of economic relevance, and marginal social cost.

APPENDIX A

MILK PRODUCTION AND UTILIZATION, CANADA,

1962-1972

	Total Milk Production	Used in Manufacture On Farms	In Factories	Milk Otherwise Used Fluid Sales	Farm-Home Consumption	Fed on Farms
			(million pounds)			
1962	18,382	174	11,416	4,972	936	884
1963	18,432	143	11,456	5,022	944	867
1964	18,505	115	11,527	5,115	925	823
1965	18,357	88	11,413	5,202	879	775
1966	18,373	77	11,489	5,248	850	709
1967	18,208	74	11,386	5,201	847	700
1968	18,362	71	11,630	5,129	842	690
1969	18,711	67	12,049	5,088	818	689
1970	18,313	65	11,572	5,200	792	683
1971	17,775	58	11,013	5,275	755	675
197[illegible]	17,709	53	11,119	5,427	448	663

Source: Statistics Canada, Dairy Statistics, Cat. No. 23-201 (Ottawa: DBS, 1972), Table 1.

APPENDIX B

HOW CANADIAN MILK SUPPLY WAS USED, 1962-1972

Year	Creamery Butter	Fluid Sales (Milk and Cream)	Cheese	Concentrated Milk and Ice Cream	Used on Farms
			(percent)		
1962	46.0	27.0	8.0	8.1	10.9
1963	44.7	27.2	9.4	8.1	10.6
1964	44.5	27.6	9.8	8.0	10.1
1965	43.0	28.3	10.9	8.3	9.5
1966	42.5	28.6	11.8	8.2	8.9
1967	42.4	28.6	11.6	8.5	8.9
1968	42.8	27.9	12.1	8.4	8.8
1969	43.8	27.2	12.4	8.2	8.4
1970	41.9	28.4	13.1	8.2	8.4
1971	37.7	29.7	15.6	8.7	8.3
1972	38.4	30.6	15.8	8.6	6.6

Source: Statistics Canada, Dairy Statistics, Cat. No. 23-201 (Ottawa: DBS, 1972), Table 4.

APPENDIX C

HOW MILK SUPPLY WAS USED, ALBERTA AND CANADA, 1972

	Creamery Butter	Fluid Sales (Milk and Cream)	Cheese	Concentrated Milk and Ice Cream	Used on Farms
			(percent)		
Alberta	42.0	28.9	3.8	12.3	13.0
Canada	38.4	30.6	15.8	8.6	6.6

Source: Statistics Canada, Dairy Statistics, Cat. No. 23-201 (Ottawa: DBS, 1972), Table 4.

APPENDIX D

NUMBER OF FLUID MILK, MANUFACTURING MILK AND FARM SEPARATED CREAM PRODUCERS IN ALBERTA, 1966-1973

	1966	1968	1970	1972	1973
Fluid Milk Producers in Alberta	——	——	873	909	897
Manufacturing Milk Producers in Alberta	1,950	1,651	1,320	1,424	1,381
Farm Separated Cream Shippers in Alberta	25,870	20,968	15,198	12,843	12,832
Total	27,820	22,619	17,391	15,176	15,110

Source: Dairy Branch Files, Alberta Department of Agriculture, Edmonton

APPENDIX E

A SURVEY OF CREAM SHIPPERS
TO DETERMINE THEIR CONVERTIBILITY TO
MILK PRODUCTION

Undertaken by Boyd Partington
in co-operation with the
Alberta Department of Agriculture

Supervised by Mr. D. J. Prince

This survey was undertaken to determine the convertibility of cream shippers to milk production. With the constant decrease in numbers of cream shippers in the province many of the cream plants are on the verge of closing their doors. As the plants close additional producers will leave the dairy industry but some might find whole milk production to be an alternative with its increased demand by the cheese factories being established in the province.

The questionnaire put before each farmer contacted asked the question of convertibility along with other questions that might assist in an evaluation of this phase of the dairy industry. We first tried to establish a picture of the size of the operation with respect to the number of cows. Also we wanted an idea of the type of facility and the breeding program, whether artificial or natural. We tried to determine the main reasons for the decline in numbers of dairy operations and how long each planned to continue his operation. Some planned to continue and also increase, an estimate of this was also asked for.

We initially planned that all cream shippers with a yearly production of approximately 3000 pounds of butterfat and within a radius of 70 milks of Wetaskiwin and Viking would be personally interviewed. However problems such as the weather made this impossible so the questionnaires were mailed out with a self-addressed envelope. Fortunately the mailing system was very successful with a 47 percent return. Out of 470 questionnaires mailed approximately 225 were returned. Then most of the producers who didn't return the questionnaire were approached personally. In this way a fair cross-section of the producers were interviewed.

When the producers were approached over the question of conversion to milk they expressed varied reactions. Some who were satisfied with cream production would not consider the added investment of a bulk tank system. Many have slowly been diversifying into a beef or hog enterprise and are slowly abandoning their dairy operations. Some producers find their dairy operation a satisfying means of making a living but would like to improve it. This group, although small, are the ones that are considering a conversion to whole milk production. Many who are considering a conversion however, are hesitating to see whether or not their sons are interested so that the high investment enterprise will be carried on and also to ensure that the labor requirements can be met. There is a sizeable group of producers who would consider investing capital in building a new barn and bulk tank set-up but they feel the skim milk is too important in their operation. Most of this group do not want to sell their calves and are convinced that they cannot economically feed their calves on milk replacer as it is too expensive and too much nutrition has been removed. In some areas the producers will not consider investment in a bulk milk system because others in the area have had bad experiences in the past by being without a market shortly after setting their operations.

Of the 350 producers interviewed about 8% were seriously considering whole milk production. Another 10% had thought about it but not made a decision. There were a few who expressed an interest in selling manufacturing milk in cans. About 20% of the producers planned a possible increase but most of these only planned on a 5 to 10 cow increase and didn't plant to be milking more than 5 years. Therefore the 20% figure does not hold very much meaning.

In determining the number of sons to take over dairy operations it appears that very few have expressed any interest. The primary reason seemed to be the lack of return to labor. The younger generations are generally not prepared to be tied down to the extent that a dairy farm requires. Because of the few sons of farmers returning to the farm it is evident that farms are going to become larger and as they do they will become less dependent on thedairy operation as a source of supplementary income therefore reducing further the number of dairy farms.

In speaking to the many cream shippers it was evident that there were a number of common grievances and reasons for the decline in interest in the dairy industry. The greatest complaint of the dairy farmer is the income to labor ratio. With the unwillingness of the labor force to become involved in the primary production of dairy products, the dairyman finds himself in a position where he must be with his cows twice a day, seven days a week. Finding himself in this position at the present return to labor many of the farmers are beginning to look at other alternatives to realize a livelihood for themselves and their families.

At present the price of feed is a problem to the producer. In many cases he is out of feed and trying to buy more. The prices are eliminating all profits. There is, therefore the person who has been considering selling his herd and now feels he can sell his cows and feed at a profit even if the price of cows is at a minimum.

The average age of the producers is 53 years. This is sure to be a factor to consider in the future decline of dairy production in Alberta. At the moment there are producers at the average age who do not have anyone to take over. In some instances their facilities are becoming run down and they are hesitant to renovate, at the present cost of building materials, as they don't feel the investment will be used long enough before retirement.

Many producers have become irritated by the inadequacies of the present quota system although in many cases it is more a question of misunderstanding of the system because of its complexity.

The increasing distances to cream plants along with the rising transportation costs have been expressed as an increasing factor in loss of profit to the cream shipper.

In summation it appears that increased milk production cannot be expected from converting cream shippers, therefore measures will have to be investigated in other avenues before a shortage of milk for direct and indirect human consumption occurs.

RESULTS OF CREAM SURVEY

	Mailed Interviews	Personal Interviews
No. of Cows in 1973 - 1974 -		
- Less than 10	18%	8%
- 10 - 15%	35%	42%
- 16 - 20	30%	33%
- 21 - 25	14%	13%
- More than 25	12%	8%
Producers using Dairy Herd Inprovement	32%	2%
Producers using Artificial Insemination	57%	52%
Distance to Creamery (miles)		
- Less than 10	18%	47%
- 10 - 20	65%	38%
- 21 - 30	24%	14%
- More than 30	2%	5%
Sons taking over dairy operation -		
Yes	35%	28%
No	50%	39%
Increased Herd anticipated	19%	23%
	(More than 50% of these increases were 5 cows or less)	
Years to continue Dairy operation -		
- More than 5 years	37%	48%
- Less than 5 years	54%	50%
Convertibility -		
- quite definitely prepared to ship bulk milk	8%	8%
- quite possibly considering bulk milk	6%	10%
- wanting to ship whole milk in cans	1%	3.6%

ALBERTA DEPARTMENT OF AGRICULTURE
POTENTIAL MILK PRODUCTION QUESTIONNAIRE (Wetaskiwin-Viking)

ALL REPLIES ARE CONFIDENTIAL

NAME ____________________ LAND LOCATION ____________________

AGE ____________________ NO. OF YEARS IN DAIRY BUSINESS ____________________

MAILING ADDRESS ____________________

HOW MANY COWS WERE YOU MILKING IN (ESTIMATE) FOR	1971	______
	1972	______
	1973	______
	1974-5	______
PLEASE INDICATE BY A CHECK WHETHER OR NOT YOU HAVE USED THE FOLLOWING PRACTICES OR ITEMS OF DAIRY EQUIPMENT ON YOUR FARM DURING THE LAST 12 MONTHS	DAIRY HERD IMPROVEMENT	YES NO
	ARTIFICIAL INSEMINATION	YES NO
	MILKING MACHINE	YES NO
	PIPELINE MILKER	YES NO
	BULK TANK	YES NO

TO WHAT PLANT DO YOU SHIP? ____________________ APPROXIMATE DISTANCE ____________________

HOW MANY YEARS DO YOU PLAN TO CONTINUE YOUR DAIRY OPERATION? (CHECK ONE)	(a) MORE THAN 5 YEARS	______
	(b) 5 YEARS OR LESS	______
IF 5 YEARS OR LESS WHAT WILL BE YOUR REASON FOR DISCONTINUING MILK PRODUCTION?	(a) RETIREMENT	______
	(b) LABOR PROBLEMS	______
	(c) FAILURE TO MAKE PROFIT	______
	(d) CONVERSION TO BEEF	______
	(e) OTHER	______

DO YOU HAVE SONS OR OTHER RELATIVES TO CONTINUE YOUR DAIRY OPERATION?	YES NO
ASSUMING THAT INCREASED PROCESSING CAPACITY FOR WHOLE MILK WERE AVAILABLE IN YOUR AREA WOULD YOU INCREASE YOUR PRESENT PRODUCTION OF MILK?	YES NO
HOW MUCH OF AN INCREASE IN TERMS OF MILKING COWS AND TOTAL POUNDS OF MILK WOULD YOU ANTICIPATE	______ COWS ______ LBS.

WHICH OF THE FOLLOWING WOULD BE REQUIRED TO EXPAND YOUR PRESENT OPERATION? (PLEASE INDICATE BY A CHECK)	(a) BULK TANK	______
	(b) PIPELINE MILKER	______
	(c) MILKHOUSE	______
	(d) HOUSING	______
	(e) MILKING PARLOR	______
	(f) FEED STORAGE	______
	(g) PASTURE - GRAIN	______
	(h) MILK COWS	______

ARE YOU PREPARED TO CONVERT YOUR OPERATION FROM CREAM TO BULK MILK?	YES NO

SIGNATURE ____________________ INTERVIEWER ____________________ DATE ____________________

APPENDIX F

ALBERTA DAIRY CONTROL BOARD JULY, 1974
404, Agriculture Bldg.
9718 - 107 Street
Edmonton, Alberta
Canada

THE ALBERTA PLAN FOR FLUID MILK POOLING AND GRADUATED ENTRY

Fluid Milk Pooling: On January 1, 1975 all fluid milk producers in Alberta will become participants in a Province-wide pool. The pool will be operated by the Alberta Dairy Control Board under The Dairy Board Act of Alberta.

The pooling of all fluid milk will result in each fluid producer being allotted a daily quota based on past shipments and each producer will receive the same equalized pay off and price for his shipments in relation to his quota. Producers will be paid by the processors and in most cases there will be few transfers of producers between plants. Fluid milk producers who do not presently hold Dairy Board fluid milk quotas will be contacted this Fall in order to establish quotas.

Federal Producer Milk Subsidy: As a result of Alberta introducing this fluid milk pooling plan and a system of graduated entry for producers into the fluid milk market, Alberta fluid producers are now eligible for the producer's subsidy on all milk shipments in excess of 104% of Class 1 milk (milk used for bottling).

Graduated Entry: The graduated entry plan is a method by which industrial milk and cream producers may enter the fluid milk market. Proximity of the entrant in relation to a fluid processing plant is not too important as the entrant may, at the discretion of the Dairy Board continue to ship to an industrial plant. However, it is important to realize that the graduated entrant may, and most likely will, be required to ship to a fluid processing plant where transportation is available with the resulting hauling charges the responsibility of the entrant.

The requirements for graduated entry for 1975 are listed on the next page (page 3). You will note that the deadline for application is October 1, 1974 for entry on January 1, 1975.

If you are interested in taking advantage of the opportunity to participate in the fluid milk pool by means of graduated entry please take immediate action by writing or telephone for information and an application form.

Please note: Entry to the fluid milk pool can still be made as formerly by securing a current quota by transfer (usually by purchase) from a present milk producer.

For further information and application forms, please contact Dairy Control Board offices located at:

Edmonton - 404 Agriculture Building, 9718 - 107 Street; Telephone 429-3771, or

Calgary - 1004 J.J. Bowlen Building; Telephone 261-6554, or

Lethbridge - 334 - 13 Street North; Telephone 328-4471, local 534.

Fairview - Dairy Branch, Box 3000; Telephone 835-2231

REQUIREMENTS FOR GRADUATED ENTRY 1975

1. The applicant must be a resident of Alberta and have marketed industrial milk and/or cream to an Alberta plant for the 12 consecutive months prior to September 1st of the year of application.

2. The applicant must have marketed a basic daily production average of at least 500 pounds of milk or the cream equivalent in the 12 months preceding the application date of September 1st of the year of application.

3. Applications must be submitted prior to October 1, 1974 for entry January 1, 1975.

4. The applicant's farm premises must meet the requirements for Alberta fluid milk production and must be approved by the Province of Alberta prior to December 1st of the year of application. This date may be extended at the discretion of the Dairy Board for a cream producer converting to milk.

5. The applicant must have installed a bulk tank of sufficient capacity to store five milkings.

6. The applicant's quality record both past and present must meet with the requirements of Regulations under The Dairymen's Act and also under Division 9 under the Provincial Board of Health Regulations.

7. The graduated entrant will receive a total quota equivalent to his daily basic production not to exceed 800 pounds per day. He shall receive 50% of his entitlement on January 1st on year of entry and an additional 25% on January 1st of the two following years.

8. Order of entrance of qualified applicants will be made by draw, if necessary. Qualified applicants for which no quota is available will be eligible with precedence in succeeding years.

9. Should conditions, of distance from processing plants, volume of production or transportation in the areas of; the Peace River Block, the Medicine Hat area to include the southeast corner of Alberta, and the Eastern Alberta border area, be such as to endanger the orderly operation of the Alberta Province-wide pool; the Alberta Dairy Control Board may deal with applications for quota as it deems advisable.

10. Upon completion of graduated entry allotments the entrant in subsequent years will be eligible for quota increases based on producion on the same basis as other fluid milk quota holders.

11. During the graduated entry period the entrant must maintain his daily basic production average. Should this be reduced his allotted total quota will be reduced on the basis of this production.

12. A producer may not transfer his right to graduated entry or his remaining entitlement except to a member of his immediate family or to the purchaser of his farm, buildings and herd as a going concern.

ALBERTA DAIRY CONTROL BOARD

June 21, 1974

AN EXAMPLE OF A PROVINCIAL MILK SETTLEMENT UNDER A POOLING ARRANGEMENT SIMILAR TO THAT USED IN BRITISH COLUMBIA - ALL AMOUNTS AND PRICES ARE HYPOTHETICAL

The Accounting Values for Classification of Milk:

Class I - $10.31 - used in fluid sales

Class II - $ 6.80 - ice cream and cultured products

Class III - $ 6.20 - skim milk powder, butter, evap. milk, condensed milk

Class IV - $ 2.70 - butter with skim lost

The accounting values of milk classification are announced by the Board as of the first of the month.

On or before the 8th of the month plants report to the Board receipts and utilization of milk received, e.g. the following is a recap of these reports:

Total producer quotas		1,150,000 lbs.		
Total producer shipments		1,500,000 lbs.		
Utilization -	Class I	1,000,000 lbs,	@ $10.31	= $103,100,00
	Class II	150,000 lbs.	@ $ 6.80	= $ 10,200.00
	Class III	300,000 lbs.	@ $ 6.20	= $ 18,600.00
	Class IV	50,000 lbs.	@ $ 2.70	= $ 1,350.00
			TOTAL VALUE	133,250.00

The Dairy Board performs the following claculations for Producer Payout:

					FED. SUBSIDY
Quota Pool	Class I	1,000,000 lbs.	@ $10.31	= $103,100.00	
	Class II	150,000 lbs.	@ $ 6.80	= 10,200.00	$2,816.00
	Class III	Nil			
	Class IV	Nil			
		1,150,000	@ $ 9.852	113,300.00	2.816.00
Over quota Pool					
	Class III	300,000	@ $ 6.20	18,600.00	7,680.00
	Class IV	50,000	@ $ 2.70	1,350.00	1,280.00
		350,000	5.70	19,950.00	8,960.00
			TOTAL PAYOUT	133,250.00	11,786.00

As determined from the above calculations the producer's prices for the month will be: quota milk $9.85 per cwt. including subsidy $10.10
above quota milk $5.70 per cwt. including subsidy $ 8.26

The Board will notify processors of these prices by the 14th day of the month.

It will be understood that all processors would not utilize their milk receipts in the same ratio as the provincial average, with some using more or less of various classes.

Should processors' utilization result in the value of milk received being greater than the average provincial producer settlement they will remit to the Dairy Board by the 15th day of the month the difference between their producer settlement and their utilization value.

Processors will make producer settlement for the previous month by the 19th day on the basis of the announced quota and above quota prices. An interim payment will have been made to producers by the 4th day of the month.

DAIRY CONTROL BOARD GRADUATED ENTRY

Average return to the producer per 100 pounds of milk

shipping only to quota

Quota % of Sales	Percentage Payoff	Without Gr. Entry	With Gr. Entry and Subsidy -$2.56
115%	87%	$ 9.78	$ 10.03
118%	85%	9.69	9.99
125%	80%	9.48	9.92
133%	75%	9.28	9.84

Average return to the producer per 100 pounds of milk

shipping 125% of quota

Quota % of Sales	Percentage Payoff	Without Gr. Entry	With Gr. Entry and Subsidy - $2.56
115%	87%	$ 9.08	$ 9.76
125%	80%	8.83	9.69
133%	75%	8.66	9.62

Prices used:		
	Class 1	$10.31
	Class 2	6.20
	Excess	6.20
	Subsidy	2.56

July, 1974

FIRST YEAR GRADUATED ENTRY VS INDUSTRIAL

Straight Industrial

800 Pound Shipper:

800 @ $8.50		68.00
Less: C.D.C. Levy @ .15 =	1.20	
Hauling @ .40	3.20	4.40
		63.20

Quota - 400 Pounds (50%)

No. 1 340 @ 10.31 =	35.05	
No. 2 51 @ 6.20 =	3.16	
Excess 409 @ 6.20 =	25.35	63.56
Fed. Subsidy: 800-354 = 446 @ 2.56		11.42
		74.98
Less C.D.C. levy 446 @ .15 =	.66	
Hauling 800 @ .55 =	4.40	5.06
		69.92

DIFFERENCE $6.72

500 Pounds Shipper:

500 @ 8.50		42.50
Less: C.D.C. levy @ .15 =	.75	
Hauling 500 @ .40 =	2.00	2.75
		39.75

Quota - 200 Pounds (50%)

No. 1 170 @ 10.31 =	17.52	
No. 2 25 @ 6.20 =	1.55	
Excess 305 @ 6.20 =	18.91	37.98
Fed. Subsidy 500-177 = 323 @ 2.56		8.27
		46.25
Less: C.D.C. levy 323 @ .15 =	.48	
Hauling 500 @ .55 =	2.75	3.23
		43.35

DIFFERENCE $3.60

PAY OFF PERCENTAGE 85

APPENDIX G

PROVINCE OF ALBERTA
DEPARTMENT OF AGRICULTURE

THE ALBERTA MILK YARD PROGRAM.

There shall be instituted as soom as possible a program in which there will be available for three farmers of more, special credit arrangements to establish a centralized milking parlor to which contributing farmers can contribute cows, feed and labour.

The intent of the program is to improve dairy production in Alberta. whether it be whole milk or cream. The following guidelines will apply:

1. The three or more farmers can well be determined by the local Agricultural Development Committee in each area, but can count as a contributor, a farmer's son who is over 18 and who indicates that his livelihood is in agriculture.

2. To such a milk yard will be available $8,000 per contributing member on an interest-free basis for three years to establish a milking parlor, dairy equipment associated with such a parlor and such other equipment as may be necessary to facilitate the development of the parlor.

3. To encourage the development of more and better dairy stock in Alberta, those farmers who want to produce cream from such a milk yard will be given a special incentive to produce improved dairy heifer calf replacements. For each dairy heifer calf replacement he may keep and feed, a special grant of $25 per head will be made. This will be over and above any other assistance that might be available.

4. The program will be under the Agricultural Development Corporation and the loans of $8,000 per contributing farmer will be assessed

by the local Agricultural Development Committee in each area, having regard to:

a. The market for dairy products in their area

b. The availability of plant capacity in their area, i.e. a milk manufacturing plant, a cheese plant, a butter plant or such other dairy plants that might be worthwhile to improve the industrial secondary processing dairy products within Alberta.

5. The program would be effective immediately and would be available to all areas. District Agriculturists and credit specialists should be conscious of the program immediately and devote some time to discussing it with people who might be interested in such a program.

6. It is considered that the location of the plant should be located where the major operator will be. The major operator can either be hired by the group or be one of the group. The majority of the group should have dairy experience and be able to take over to make sure that labor is available for times of holiday, illness or such other matters that may crop up from time to time.

7. This program does not and should not prohibit individual farmers from borrowing to the maximum credit available through their financial institutions for breeding stock.

It would be the intention though, of the Government, that the breeding stock would be bred to dairy breeds so that we can increase the number of dairy heifers that we might have available for sale on the export market. In this regard, detailed records are important and D.H.I. would be an important consideration of whether or not such a program would be approved by the local committees. They should be aware that the breeding history of the animal involved and its production history is essential to the increased marketing of the calves that are involved.

Training for participants an essential element.

June 21, 1973

APPENDIX H

AN HYPOTHETICAL CO-OPERATIVE DAIRY (For Alberta)

The Alberta Milk Yard Program of the Alberta Department of Agriculture provides the opportunity for Alberta residents to participate in the strengthening of the dairy industry in Alberta. This anticipated increase in activity in the dairy industry will provide economic stimulus and increase the incomes of participating farmers due to the exploitation of economies of size, labor specialization, improved management expertise and the not immediately recognized benefits of a cosmopolitan group of shareholders.

Dairy co-operatives so called, are prevalent to some extent in southern Utah and operate from several basic organizational structures ranging from the very loose and marginally integrated to the sophisticated co-op-corporative type of fully integrated units. The determining factors in the resulting structure are; first, the group of people involved and their preference relative to agricultural fundamentalism, and secondly, implication of the tax laws.

There are three very basic possibilities when considering dairy co-operatives. They are as follows:

A. "The Community Milking Parlor"
B. "The Co-operative Dairy"
C. "The Co-operative Farm"

Definitions:

A: "The Community Milking Parlor", consists of an arrangement among a group of dairy farmers whereby central facilities are provided for milking cows and storing the milk. Facilities are available for sampling, testing and weighing each cow and each herd. The herd may be housed adjacent to the milking facility or may be brought to the center from some distance. Milking times are scheduled and rotated as determined by the group. A full time milker is usually hired to assist the herd owner in milking his own cows. Maintenance and operational expenses are pro-rated to the participants on the basis of cow numbers. The governing body is an elected board of representatives from the shareholders. The shareholders are generally all dairy farmers.

Due to distances involved, it is not likely that the community milking parlor will gain acceptance in Alberta.

B. "The Co-operative Dairy" is a cow pool, actually. This arrangement includes the co-operative management of the cow herd as well as the milking parlor and milk house. There is a general manager and support staff as required depending mainly on the size of the herd. Initially, the shareholders may contribute cows to the co-operative but they lose their identity and become the property of the co-op. Feed procurement is via the open market and may be from co-op members or otherwise. Dividends are paid from net profits to shareholders on the basis of share capital, or if the labor is supplied by members, on the basis of labor provided.

The governing body is a board of representatives elected by and from the shareholders. This board determines policy which the manager is expected to implement and carry out. The shareholders may be farmer or non-farmer and in fact, there is some advantage to the inclusion of non-farmer members due to the resulting diversity of opinion, experience and expertise then available to the organization.

Of the three possibilities, the Co-operative Dairy offers the most promise for implementation in Alberta.

C: "The Co-operative Farm" is a further integration of the operations involved in milk production in that the land base associated with feed production for the herd is also co-operatively held. The inclusion of the land base for feed production in the co-operative greatly expands the scope of the operation and complicates it extremely both from a logistics and a people standpoint. The governing body is a board of directors with a board president to determine policy. A general manager then carries out that policy. The shareholders may be farmer or non-farmer and entry and exit would be determined by the board of directors combined with market conditions.

The co-operative farm will not likely have much appeal as far as the traditional Alberta farmer is concerned, due mainly to its Hutterite Colony similarities combined with agricultural fundamentalism among farm people.

PRESCRIPTION FOR AN ALBERTA CO-OPERATIVE DAIRY

(Under the Alberta Milk Yard Program)

Organizational Structure will be on a co-operative basis, and the percentage of shares held by one individual must be limited. Government support may be needed depending upon the relative success of the venture. Some degree of assurance and partial guarantee may be necessary in order to interest people in taking the risk in a new venture.

Subsidiary structures are to be set up as necessary to take full advantage of tax laws, to satisfy requirements of financial institutions, and any legal complications that may arise. In so far as possible the membership should be predominantly agriculture oriented but significantly cosmopolitan.

Ideally, in a co-operative dairy, shareholders would be made up of the following people:

-6 marginal farmers (i.e. less than 50 cows)
-6 commercial dairy farmers (i.e. more than 50 cows)
-6 non-dairy farmers
-6 non-farmers

The rational supporting the foregoing co-op membership make-up is:

1) the goal of the Alberta Milk Yard Program is to help Alberta's marginal farmers so they must be involved

2) commercial dairy farmers have expertise and experience in dairy operations which will be beneficial to the new organization

3) non-dairy farmers give more scope to the pool of management expertise available

4) non-farmers will provide a levening to an otherwise totally land oriented organization. Also there is the possibility that the non-farmer member may be an accountant, a lawyer, a veterinarian, or 'a laborer' whose special knowledge or skills may be very useful to the dairy co-op.

Organization and Development of the Dairy Herd. Any person may become a shareholder in a dairy co-operative initially by buying shares in the organization. This may be done with cash or cattle, the cattle to be accepted on the basis of an independent appraisal. However, only open heifers will be eligible to enter the initial dairy herd. All cattle offered for shares in the co-op will be converted to good quality open heifers. The heifers will be bred to the best bulls available with regard to milk production. The breeding will be by artificial insemination. The herd is to be put on test with the provincial D.H.I. immediately production commences.

The time required to move a herd of open heifers to the production line will be utilized to construct the necessary buildings, to install the related equipment and to retrain any of the members of the co-op who may anticipate working for the organization. This is a very important aspect of the implementation of co-operative dairies; that is, the farmers involved, particularly those who are to work for the co-op must accept new and better ways of doing things, as well as direction from others. This can only be accomplished by retraining over a period of time. The Alberta Department of Agriculture and other government agencies must facilitate this need.

Historically, dairy farms in Alberta have only managed to pay interest on investment and labor requirements in addition to operating expenses. Thus the necessity of the marginal farmer becoming involved in supplying the labor in the initial stages of the co-op. There will likely be no dividends in the first few years of the operation. The more independent investor is able to survive this time of low return whereas the marginal farmer cannot.

Implementation

Step 1. Circularize all potential areas with information relating to co-op dairies in sufficient detail to answer immediate questions and raise the interest of community and farm people.

Step 2. Call a meeting and present further information and discuss.

Step 3. Organize the interested parties and require a financial commitment of $10 - $100 to help finance a feasibility study to separate the talkers from the interested.

Step 4. If feasibility study warrants, the interested parties will be organized into a co-operative, with a board of directors and a president. Eligibility for membership with options to buy shares is contingent upon the financial commitment in Step 3.

Step 5. Accumulation of capital and formation of the dairy herd will be as follows:

-six marginal farmers will offer 20 cows each, valued at an average of $500 each, equals $10,000.00 per farmer and $60,000.00 total capital. Each marginal farmer then borrows an additional $10,000.00 bringing the total capital held by each farmer to $20,000.00 and the total capital available to the co-op from the six marginal farmers to $120,000.00.

-six commercial dairy farmers will offer 20 cows each, valued at $500.00 each which equals $10,000.00 in capital per farmer and a total of $60,000.00 capital to the co-op. Each commercial dairy farmer will continue to operate his own herd independent of the co-op.

-six non-dairy farmers will offer $10,000.00 each which equals a total of $60,000.00.

-six non-farmers will offer $10,000.00 each which equals a total of $60,000.00

The result is as follows:

-six marginal farmers @ $20,000.00 each = $120,000.00

-six commercial dairy farmers @ $10,000.00 each = $ 60,000.00

-six non-dairy farmers @ 10,000.00 each = $ 60,000.00

-six non-farmers @ $10,000.00 each = $ 60,000.00

Total capital = $300,000.00

The utilization of the capital will be $180,000.00 for land, buildings and equipment, and $120,000.00 for purchase of open heifers, breeding and feeding them until they freshen.

Opportunity for members of the co-op to obtain share capital by working on the construction of the required buildings should not be overlooked. Also, members able to provide legal, accounting or veterinary services should be provided the opportunity to do so. The co-op manager will be responsible for the accumulation and disburesment of the available capital with direction from the board and directors and relevant government agencies.

Basic Assumption: It will now be assumed that three of the marginal farmer co-op members will be interested in working for the organization on a permanent basis, while all other co-op members will not be interested in working for the organization.

Those co-op members anticipating working for the co-op must be retrained. This retraining would be part of the adult education programs government sponsored, and would take place during the preparation of the dairy herd and the construction of the buildings. This part of the implementation of a dairy co-op is crucial and must not be overlooked. This is the way in which the characteristic agriculture fundamentalistic philosophy of the marginal farmer members will be tempered, hopefully, and of course the technical information gained will enable them to "qualify" for employment with the co-op.

It will be necessary to purchase all feed. In this connection it is timely to recognize that feed production and milk production are two quite different and separate enterprises. No longer is it reasonable to presume that a farmer must run his feed and forage through an animal in order to convert it to cash.The agriculture industry and governments must recognize this fact first, otherwise other industries and society as a whole will never recognize it. It is legitimate and reasonable to expect that efficient producers of both feed and of milk should make a profit on their operations.

Cows are to be dry-fed the year around. A combination of silage, roughage and concentrates to be utilized. Sufficient land must be acquired to provide some pasture for young stock and dry stock but they should be dry-fed principally, as well.

Summary and Conclusions.

The objectives of the Alberta Milk Yard program may be satisfied by the Dairy Co-operative that exploits economies of size, scale and labor to increase milk production and net returns to farmers and others who may be involved. There is a reasonable possibility that circumstances in Alberta's dairy industry; re - technology, the average age of Alberta's farmers, the revolution in the philosophy of the times, (that is, a swing to anti-materialism amongst the young, including rural youth) may be appropriate for such a venture.

Theoretically, all cows producing milk for the factories at Thorsby or Bashaw could be handled in a dairy co-operative, while farmers presently involved in managing them could specialize in feed production. There are advantages in such an arrangement and it is desirable that a feasibility study be carried out to determine its potential. A further integration of the total operation would be that the shareholders in the dairy co-operative own and operate the cheese factory as well. This is now the case at Thorsby, while the operation at Bashaw is privately owned.

Dairy co-operatives have a potential in the Alberta dairy industry. It is not reasonable to expect a spontaneous generation of a co-op from the rural grass roots. Government has a responsibility to initiate, inform, precipitate decisions, and facilitate appropriate action based on those decisions. Other areas of possible application of the dairy co-operative concept would be on Indian reservations in northern parts of the province.

APPENDIX I

AGRICULTURAL FUNDAMENTALISM AND AGRICULTURAL METAMORPHOSIS

Agricultural Fundamentalism and Agricultural Metamorphosis are countervailing concepts; the first implies a maintainance of the basic philosophies and structures, while the latter implies a characteristic staged development. Many people, farmers and politicians, accept the philosophy of Agricultural Fundamentalism in spite of present day trends in farm size and numbers of farmers. The description that follows is taken directly from a paper "Physiocracy and American Agricultural Policy" by T. A. Peterson, Department of Agricultural Economics, University of Alberta, Edmonton, 1968.

Agricultural Fundamentalism

> Agricultural Fundamentalism is described as the special attitude that people have toward agriculture. This attitude consists of a deep seated conviction that agriculture is "par excellence the most fundamental industry, and that farmers are, in a peculiar sense and degree, of basic importance in society." It is a doctrine adhered to the world over including the western hemisphere. Like the general proposition of the Physiocrats, who are credited with its synthesis, agricultural fundamentalism claims that agriculture is the foundation of national prosperity more than any other industry or occupation. While the Physiocrats usually receive credit for its origin, one could easily speculate that the common origin stems back into ancient times, when the mysticism of biological phenomena

first made an impression on people. This, coupled with historical experiences of starvation, and virtually 100 percent agrarian economies have perhaps had a much greater effect on the perpetuation of agricultural fundamentalism than the Physiocrats. They might be more adequately described as modern synthesizers of the doctrine than as its creator.

Regardless of its origin, agricultural fundamentalism has had and still has a great influence on agricultural policy. "Agriculture is said to be different from all other production, because of its biological nature, because it is eternal, because it keeps man close to the soil and mother earth, because it provides food, clothing and shelter -- the three basic needs -- and because it is mentally and physically a healthier occupation than most industrial work, and as a craft of artisans gives greater satisfaction in work than most urban occupations."

Tied as agriculture is to tradition, religion and the scriptures, ethics and a way of living which is close to nature, fundamentalism is a slippery concept with which to deal. While most knowledgeable thinkers acknowledge a great deal of merit in the idea they also recognize that it is loaded with half-truths, and metaphysical aspects. These half truths are difficult to challenge in a scientific manner, due to the intertwining of agriculture with the many traditions of the past. It has, for example, been believed by many that the farmer and his family add more to morality, self-reliance, political stability and patriotic behavior than his urban counterpart. He is credited with maintaining the urban brain and muscle pool. Are such assertions really true in modern economies? Those who have dared test some of these beliefs through research have found that in many cases there are exceptions. However, because of the tradition steeped position of agriculture, objective research is still thwarted by the metaphysical atmosphere in which agriculture is shrouded, even in highly developed economies. These attitudes are held not only by farmers, but also by theologians and many economists themselves. Politicians are always ready to accept the doctrine for what it is worth in soliciting votes, thus frequently frustrating any attempts at objectivity in the process of farm policy formulation.

This is typified by an excerpt from the National Catholic Rural Life Conference in the United States in 1960.

> Our conviction of the value of the family farm is based on what we believe to be hard headed realities. Agreement has been universal that it is the bulwark of Christianity and democracy, as well as the most efficient way of farming. It affords the family an opportunity to work and pray as a unit sufficiently separated from neighbors to assure a close knit unity among its members. Children reared on such a farm find natural opportunities to develop skills and a sense of responsibility conducive to the formation of good character and citizenship.

The soundness of agricultural fundamentalism today should be questioned, not because there is no truth in it, but because there is enough untruth in it to lead policy makers astray. It frequently stands in the way of progress by formulating policies which attempt to neutralize the social and economic forces at work, instead of ones which are compatible with them, thus ironically, frequently acting contrary to the interests of agriculture in the long run. Many present farm policies tend to have this effect, because they attempt to redistribute and enhance farm incomes through the price system. Thus, many are kept in farming at a subsistence level, that might otherwise have moved into other lines of endeavor through retraining and relocation types of policies. It can no longer be argued that agriculture is uniquely basic or different in a country such as America. Rural-urban differences are shrinking. The removal of agriculture from the realms of the metephysical and looking at its problems objectively, formulating policy based on rational decision making, will likely generate more support from society in the next half centure than will the effects of a fundamentalist philosophy. The American public is in the future more likely to react positively to well thought out and researched policy alternatives based on fair play, justice and equality of opportunity, than emotional metaphysical appeals and non-enforceable threats as a means of publicity. This does not mean that advantages or disadvantages of rural life need to be thrown out the window. It does mean, however, that both social and economic costs of various policy alternatives must be analyzed with a more objective measuring stick, than has been the case in the past.

Agricultural Metamorphosis

Insect metamorphosis involves three basic changes, from larva to pupa to imago. Agricultural Metamorphosis involves four basic changes from sod buster to mixed farm to commercial farm to co-operative farm. In each instance the stages bear scant resemblance to each other in appearance, or approach. Drastic physiological or philosophical changes occur from one stage to the next. In each instance a resistance to change means eventual death. The changes occur at varying rates with relatively long intervals between, but the adjustment to change and preparation for anticipated change is continuous. Each stage is uniquely timed and triggered by external forces combined with internal mechanisms, either biological or philosophical. Each stage is characteristically equipped to exploit the external environment, but as the environment changes each stage becomes vulnerable unless it advances as well.

The early sod-busters of western Canada and U.S. transformed into diversified mixed farmers for reasons of survival. Diversified mixed family farms are specializing and expanding into commercial farms for reasons of survival. Commercial farmers are being forced to consider the anti-materialism of the rising generation, the increased emphasis on human values and significant changes in land use and land tenure systems. The basic production economies of North American Hutterite Colonies and the Israeli Kibbutz and Moshava farms with a variety of social arrangements are the subject of western scrutiny. In each instance the economic and social performance is impressive.

Agricultural Fundamentalism and Agricultural Metamorphosis are in reality antagonistic and countervailing to those who do not survive. To those who do the concepts run parallel with sufficient lag time to make the change. Subsidization will not stop Agricultural Metamorphosis, it will only prolong the agony.

Lindley Finch, Vice President and Agricultural Consultant of Continental Bank said:

> The capital base of agriculture is being restructured - more by non-farmers and what happened off the farm than by those who till the soil and mind the herds. Finch noted that as agriculture loses its uniqueness and becomes more closely identified with the business world, it will be regarded more generally as an industry that should operate for the benefit of all consumers - not just for the benefit of farmers.

(As reported in "The Cheese Reporter". The Cheese Reporter Publishing Co. Inc., Madison, Wisconsin, June 7, 1974.)

APPENDIX J

A COMPARISON OF SELECTED CHARACTERISTICS OF ONE-, TWO-, THREE- AND FOUR-MAN DAIRY FARMS IN MINNESOTA

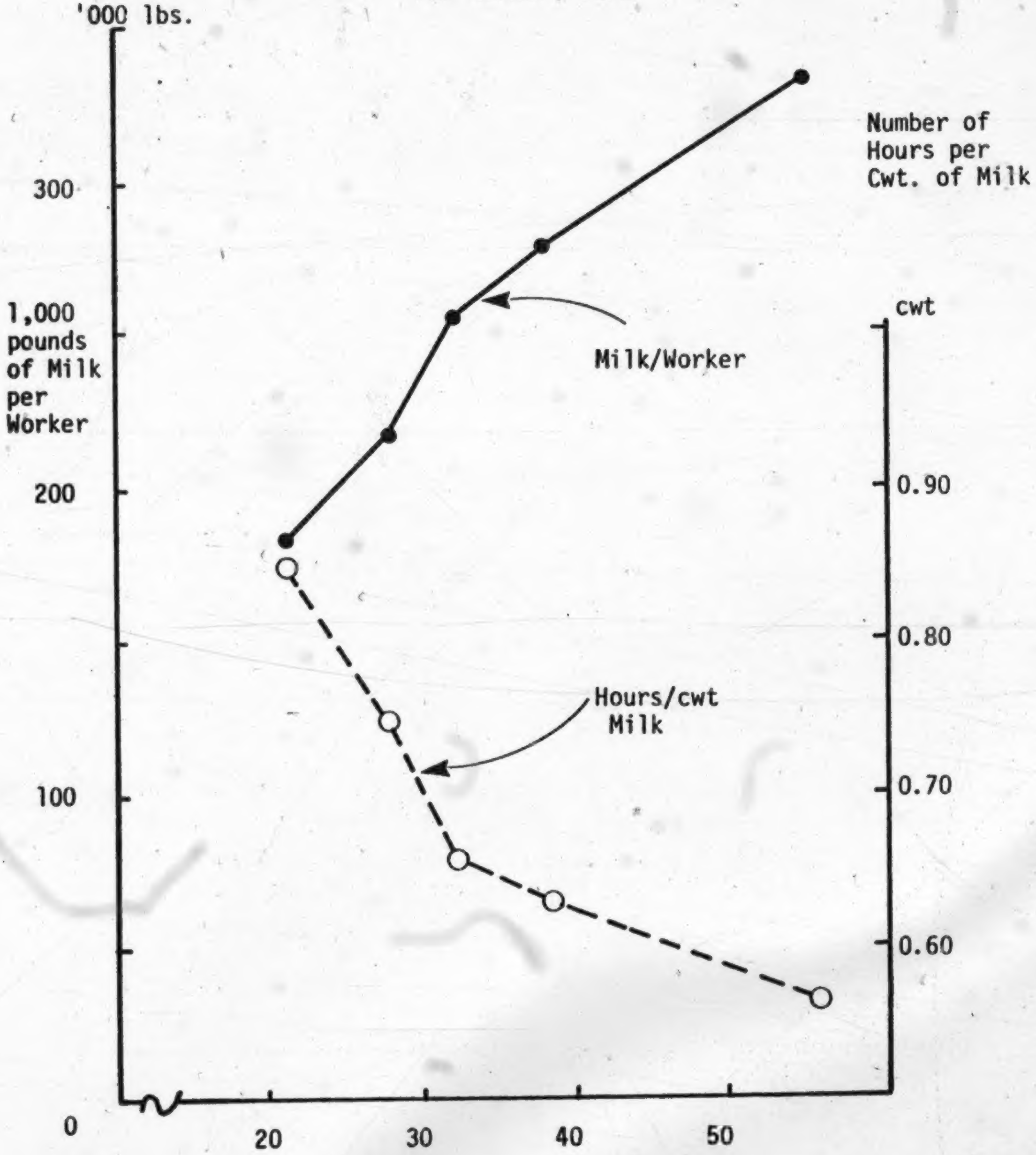
	Situation No. 1	Situation No. 2	Situation No. 3	Situation No. 4
Number of men	1	2	3	4
Number of cows	35	73	108	148
Total cropland, acres	203	421	623	870
Total investment, dollars	135,288	243,156	324,564	435,728
Gross income, dollars (1)	26,000	54,000	80,000	110,000
Total costs, dollars	22,483	43,624	62,244	85,600
Net returns, dollars	3,517	10,376	17,756	24,400
Cost per dollar of net income, cents	86	81	78	78

(1) Each of the 4 farms received 60% of gross income from the dairy operation.

Source: B. M. Buxton and H. R. Jensen, Economies of Size in Minnesota Dairy Farming, Univ. of Minn. Agricultural Experiment Station Bull. 488 in co-operation with Farm Production Economics Division. ERS, USDA (St. Paul, Univ. of Minn. and USDA, 1968).

APPENDIX K

Effect of Size of Herd on Milk Production Per Worker, 1972



Size of Farm: Number of Cows

Source: Dairy Herd Analysis Service, Quebec, cited in Food Prices Review Board, David L. MacFarlane and Lewis A. Fischer, McGill University, 1974.

APPENDIX L

ADOPTION OF DAIRY TECHNOLOGY: CANADIAN DAIRY COMMISSION 1971 SURVEY

	Milking Machines	Pipeline Milkers	Can Coolers	Bulk Tanks	Farm Account Books	Performance Testing and Recording	Artificial Insemination
	(% adoption by CDC survey respondents)						
Cream producers	43	8	18	1	37	3	40
Manufacturing milk producers	87	6	44	47	56	15	56
Fluid milk producers							
Ontario	92	25	2	99	73	57	89
British Columbia	91	38	1	99	50	52	96

Source: Canadian Dairy Commission, 1971 Survey

APPENDIX M

Cleon M. Katter, Agricultural Information Specialist with Utah State University Extension reported in the "Extension Service Review", U.S.U. Logan, Utah. April, 1973, on the success of the Gunnison Valley Dairy Cooperative as follows:

> How can a rural farming area recoup after it loses some of its major agricultural enterprises? The people of Gunnison Valley in Sanpete County, Utah, have found an answer.
>
> Their once-thriving vegetable crop industry faded out because it was too small for mechanization and thus the labor costs remained high.
>
> A few years later the local sugar factory closed, as did several other factories that were close enough to make the shipping of sugar beets practical.
>
> These losses were a terrific economic blow to the little rural valley whose agricultural economy had been built around sugar beets, vegetable crops, livestock, and dairy.
>
> Now the loss has been reversed, thanks to the efforts of the Utah State University Extension Dairy Team, working with dairymen and local community leaders.
>
> Dairying in general has been greatly enhanced in the Gunnison Valley through individual and team efforts of USU staff. But the most significant accomplishment, attributable largely to work of the USU Extension Dairy Team has been the establishment of the Gunnison Valley Dairy Association.
>
> At this point, the Extension dairy team became involved. It consistsof the Extension dairy specialist, economist, marketing specialist, agricultural engineer, Extension Veterinarian, and the head of the USU dairy science department.
>
> To back them, they had findings of a special marketing study conducted in the State, the experience of helping to organize a large pilot cooperative dairy enterprise, and the experience of helping several groups in the State organize dairy units of economic size.
>
> At the invitation of the county agent, several of the team members represented the university at three organizational meetings. They explained the economic advantages of a large, consolidated dairy herd, managed under one head and utilizing common facilities.
>
> They determined that for tax advantage it would be best to organize as a production cooperative. The biggest hurdle, however, was to get adequate financing. Experience with other cooperatives had shown that regulations of the Federal agencies which finance much of agriculture prevented them from funding an organization of this type.
>
> Before starting construction, they went on several idea-gleaning tours of large dairies in Utah and neighboring

States, arranged by the county agent and the Extension Dairy Specialist.

At the team's suggestion, the group decided to buy only unbred heifers so that breeding by artificial insemination could begin immediately. More than 1000 heifers were bought and put out under contract to local farmers to raise until ready to calve.

The Extension Economist helped work out the financing. Ten percent of the initial money (that used for buying the heifers) was raised from among 23 members of the local development company, 30 percent from the Gunnison Valley Bank, and 60 percent from SBA on a 20-year loan.

When the milking operation began in November, 1971, the Gunnison Valley Dairy Association was officially organized as a production cooperative. The bylaws assure retention of local resident control.

The Gunnison Valley Dairy Association has been operating for a year. Guided by advice from the Extension Veterinarian and Dairy Specialist, they have had relatively good herd health. Milk production has been maintained at a high pooling herd average, projected at 16,000 pounds of milk a year per cow.

The present output of more than 40,000 pounds of grade A milk from nearly 1,000 cows now milking is making a sizable economic input into the valley.

Economic projections made by the Extension dairy team indicate that as the dairy grows to its planned size of 2,000 cows, it will be bringing the area nearly $2 million annually in milk and cattle sales.

This year, more than one-third a million dollars has been redistributed to area farmers for feeding the heifers and for the feed grown on contract by them for the dairy.

The $440,000 spent for labor and building materials and a sizable tax assessment on the facilities and animals are making an important contribution to the local economy as well.

Many Extension techniques for involving people have been necessary to get this dairy association started. The Extension dairy team has spent much time and effort working with the local epople and with SBA and other agencies as well as working remotely from the University on specific problems.

Corn and alfalfa hay fields now flourish in Gunnison Valley on acreages where sugar beets once grew. And they use the limited supply of irrigation water more efficiently.

Practically all the forage grown in the valley is now used locally. This has strengthened the price and eliminated the necessity of trucking it elsewhere. And every major dairy processor in the State is offering attractive prices for the milk.

> Sparked by the growing success of these developments, the three communities in Gunnison Valley are experiencing a spirit of pride and optimism that is fostering further economic development and growth.
>
> In fact, the local banker reports that they are experiencing some of the best growth in the State. No longer do the local people lament the loss of their sugar beet industry.

The foregoing report appeared just prior to the Alberta Milk Yard Program 'White Paper' which was circulated in June, 1973. As a result, I toured some of these dairies in August, 1973, and again in March, 1974, the latter including Arizona. A brief report follows:

OBSERVATIONS AT SOME UTAH AND ARIZONA DAIRY COOPERATIVES, August, 1973

Preamble - The meeting on Monday morning provided me with an opportunity to question all six members of the U.S.U. Dairy Team about dairy cooperatives in Utah. It was point out to me that the President of U.S.U. at Logan had offered the entire resources of the U.S.U. to solve problems of rural Utah.

The Dairy Team stressed the team approach, the group was informal. In a sentence, some members of the team suggested the following:

1) Coordination of the efforts within and from outside the multi-disciplinary dairy industry is essential (Spencer Daines, Engineer).
2) The American Farmer's future lies within the cooperative even to the extent of one "pool" nation wide. (Rondo Christensen, Extension Economist)
3) Individual interest and commitment is requisite to success of any cooperative. (Geo. Stoddard; Head, Dairy Department U.S.U.)
4) Very unique and tailored structural arrangements are often required in order to exploit tax laws to the full extent. (Paul Grimshaw, Extension Economist and Associate Dean, College of Agriculture, U.S.U.)

The following are reports of dairies visited.

Gunnison Valley Dairy Cooperative Association, Gunnison, Utah.
Gene Yardley, Mgr; Eugene Jensen, Bd. Pres.

There is a cosmopolitan group of twenty three shareholders made up of six dairy farmers, eight farmers other than dairy farmers, the balance are urban people, including a doctor, two school teachers and some tradesmen. A maximum of 100 cows (shares) per man is allowed in units of 25, 50 and 100.

A group of three of the shareholders form a corporate structure for tax and loan purposes and they then lease the equipment and buildings to the cooperative which includes all 23 shareholders. All profits to date have been turned back into the coop, but when dividends are declared, it will be done on the basis of the share capital owned by the shareholders.

The dairy is set up to handle 1200 cows but is at present milking only 940. They started out with 1400 unbred heifers, culling has reduced the herd some, and no replacements have been procured, they prefer to wait the freshening of their own born and raised heifers, due to begin in October for this year.

The cows are handled in twelve 100-cow, cement floor, open corrals with butterfly roofs over free stalls. Some wetness noted, though not serious. They are watered at a central location in each corral and fed around the perimeter through lock-in stantions, no grain is fed during milking.

Young calves are held in individual pens for first two months. These appear to work very well. Young stock and heifers are held in pens of 100. Manure is pushed from the alleys of the corrals to the ends of the corrals and stored or loaded on the shareholder's trucks. So far, there has been a good demand for all manure. No charge is made. Relatively low incidence of mastitis is a result of the fact that all cows in this herd were procured very selectively as heifers and all milking cows are young. Present mastitis program is very skimpy, being treatment of acute cases only. Manager is not happy with present situation and expects to make some changes in this area.

All feed is procured from the open feed market, some coming from members of the coop and some from others. Feeding corn sileage, haylage, alfalfa, grain (barley). Corn is contracted. One 20,000 ton trench silo used. Total annual feed requirements are 3,000 tons alfalfa, 3,000 tons grain and 17,000 tons corn sileage.

Fortunately for Utah farmers, housing requirements for dairy cows are far less in Utah than in Canada. An engineer from U.S.U. has designed a basic 100-cow unit which can be replicated as necessary.

This dairy is equipped with double-ten herringbone milking stalls and Delaval-200 milkers. Two men operate the unit and average 100 cows per hour and so milk twenty hours a day.

Approximate capital cost of building and equipment was $540,000.00. This is about $450 per cow.

The man responsible for the milking is a middle aged man who had never milked a cow before joining this company. He is a shareholder in the company. Two men work in the pit. Cows are hosed down with warm water from a hose as they enter. They are then wiped dry using a sponge. The milkers are then attached. Each set of twenty cows is in the milking stalls a total of about ten minutes per milking.

The general appearance of this dairy was excellent. The cattle were a little dirty but appeared to be in good health.

The labor requirement on this dairy is twelve men, about one man for 100 cows. The manager has a direct line of communication with each foreman in charge of milking, young stock, and calves. Both manager and assistant manager are shareholders, all other employees are nonshareholders.

Strengths of Gunnison Valley Coop Dairy

(a) Relatively high milk production level.
(b) Top management
(c) Timeliness of commencement of this coop, relative to markets and price of stock and feed
(d) diversity of shareholders

Weaknesses of Gunnison Valley Dairy Cooperative

(a) It really hasn't helped the marginal farmer except possibly indirectly

Minersville Dairy Cooperative, Minersville, Utah.

There are five shareholder farmers in this coop, each is a dairyman. Only the milkhouse and milking parlor are jointly held. The five shareholders milk about 700 cows. The cows are held in five separate herds, some cases several blocks from the milking facility. Dry stock, calves, young stock, manure disposal and feeding are all the responsibility of the individual farmer. Mastitis control and program is poor.

This is the original dairy coop in Utah and has been in use about thirty years. The milking parlor is simply a stanchion type barn holding 32 cows with necessary corrals adjacent. Cows are prepared and milked by the farmer and hired milker. Procedures not impressive. Production level at about 35-40 pounds per cow per day. General appearance of cattle - good. General appearance of buildings, and equipment fair only.

The Cow Palace, Minersville, Utah.

All shareholders are farmers previously involved in the original Minersville Dairy Co-op who desired to expand the size of their herds and disassociate themselves with the management and milking operations. There are seven members of the Co-op with a non-member Rex Brown, operating the unit.

The milkhouse, milking parlor, cows, corrals, equipment and land occuppied by the dairy (40 acres) are held co-operatively. There are about 750 milking cows in this herd. Procurement procedures included cows from the original herds as well as some purchased cows and heifers. Cows are handled as a common hered in 100-cow corrals previously described. Manure disposal is via ramps, storage trenches and distribution to member farmers.

Mastitis control program is poor, evidenced by one cow in one corral being obviously very ill as a result of it.

This herd has experienced very serious health problems due to an infected cow purchased in Colorado and brought into Utah. Utah is relatively brucellosis free. However, over a three year period this one animal has incurred an estimated animal loss of $100,000 each year.

General appearance of the cattle was not good. However the buildings and equipment, being relatively new, were satisfactory.

Circlville Dairy Cooperative, Circlville, Utah

Three shareholders, two brothers and a third party. Only the milking parlor and milkhouse are held cooperatively. Each shareholder milks from 110-140 cows. Each herd is held separately in a corral adjacent to the milking parlor. All dry stock and young stock is usually held at the home farms. Calves are held in individual pens at the dairy. Manure disposal is via ramps, storage trench and removal seasonally to the home farms. Mastitis control varies from herd to herd but was not impressive. It appeared to be very haphazard and inadequate. General udder health did not appear to be very good, although general appearance of the cows was good. Each farmer fed his own herd and was responsible for procurement of his own feed. Each farmer milks his own cows, however, some choring for each other is common. Milking procedures were poor. All partners seemed satisfied with the entire operation. General appearance of cattle, buildings and equipment was good.

Strengths of this unit are:
(1) Some capital cost has been spread
(2) Possibility of helping each other
(3) Identity of herd retained by farmers

Weaknesses of this unit are:
(1) The farmer still must milk twice a day
(2) Time allotment for use of facilities varies
(3) Insufficient saving on capital spread to make it worthwhile

Valley Hi Dairy Cooperative, Loa, Utah. Mathew Chappel, Mgr.
-located 7,500' above sea level.

Shareholders are all marginal type dairy farmers in the 15-20 cow range. The cows are pooled and held cooperatively as well as the milking parlor, milkhouse, equipment and the land occupied by the cows and buildings. There were 16 cows originally obtained from the shareholders as milking cows. There are 170 cows being milked at present.

Manure disposal is via a ramp, to a storage trench and then member farmers haul it away for their own use. This system not working well and manure is piling up. Also two of the ramps were broken off due to carlessness of the tractor operator combined with a poor reinforcing cement job originally.

Mastitis control is poor. The fact that this herd was gathered from various producers has multiplied the mastitis as well as other health problems in the herd.

Feed procurement is on the open local market from coop members and non-members alike. Some of the feed bought last year has not been paid for because the money was used for capital expenditures. A loan is to be obtained soon in order to clear this indebtedness. At this elevation, the feed available does not include corn.

General appearance of cattle is fair to poor. Labor requirement is relatively high due to the size of the herd. Construction sill going on so exact labor input into the production unit difficult to determine due to some men going from construction to production work.

Strengths of this unit are few. Possibly one would be that since sending their cows to the coop farmers have more time to spend in feed production.

Weaknesses of this unit are:

(1) Poor mastitis program
(2) Poor overall herd health
(3) Inadequate manure disposal
(4) A shortage of feed stockpiled for winter
(5) Undercapitalized
(6) High calf mortality rate
(7) Limited managerial freedom. Much interference from Board members and others.
(8) Conflicts amongst local factions
(9) Rate of milking too slow

FREE ADVICE received from various contacts made was as follows:

1. Gene Yardley, Mgr., Gunnison Dairy Co-op;
   - it is easier to train a new man than to change an experienced man
   - think big. If Gene were to do it again he would think in terms of 2400 cows as a beginning instead of 1200.
   - it is desirable to have non-farm people involved in a dairy co-op.
   - Rural development policies of both the state and the U.S.U. seem to have been a forerunner of the advent of co-op dairies.

2. Rex Brown, Manager, Cow Palace, Minersville
   - involve only high producing, disease-free cows in a cow pool
   - women may be involved to advantage in both the management and the labor aspects of a co-op dairy.

3. Eugene Jensen, President of Board, Gunnison Dairy Co-op (a farmer)
   - let the manager manage.
   - be conscious of the indirect benefits of the dairy co-op, e.g. better feed market, availability of bull calves for feeding by smaller farmers.

4. Cleon Kotter, U.S.U. Information Specialist
   - allow adequate preparation and training time for potential participants to become dairy co-op oriented.

5. Faye Marschall, President of Board, Cow Palace, Minersville.
   - limit the size of the dairy co-op in terms of members to a group of less than ten shareholders.

6. Paul Grimshaw, Extension Economist and Associate Dean, College of Agriculture, U.S.U.
   - Utah has yet to properly finance a dairy co-operative because of the lack of appreciation for the long term aspects of the dairy industry. This is true in financial as well as government circles.

Summary and Conclusions

This tour of dairy co-operatives in Southern Utah has provided a basis from which to launch projects under the Alberta Milk Yard Program. A variety of organizational structures combined with various herd sizes were observed and discussions held with people involved.

General information and insights gained from the tour may be summarized as follows:

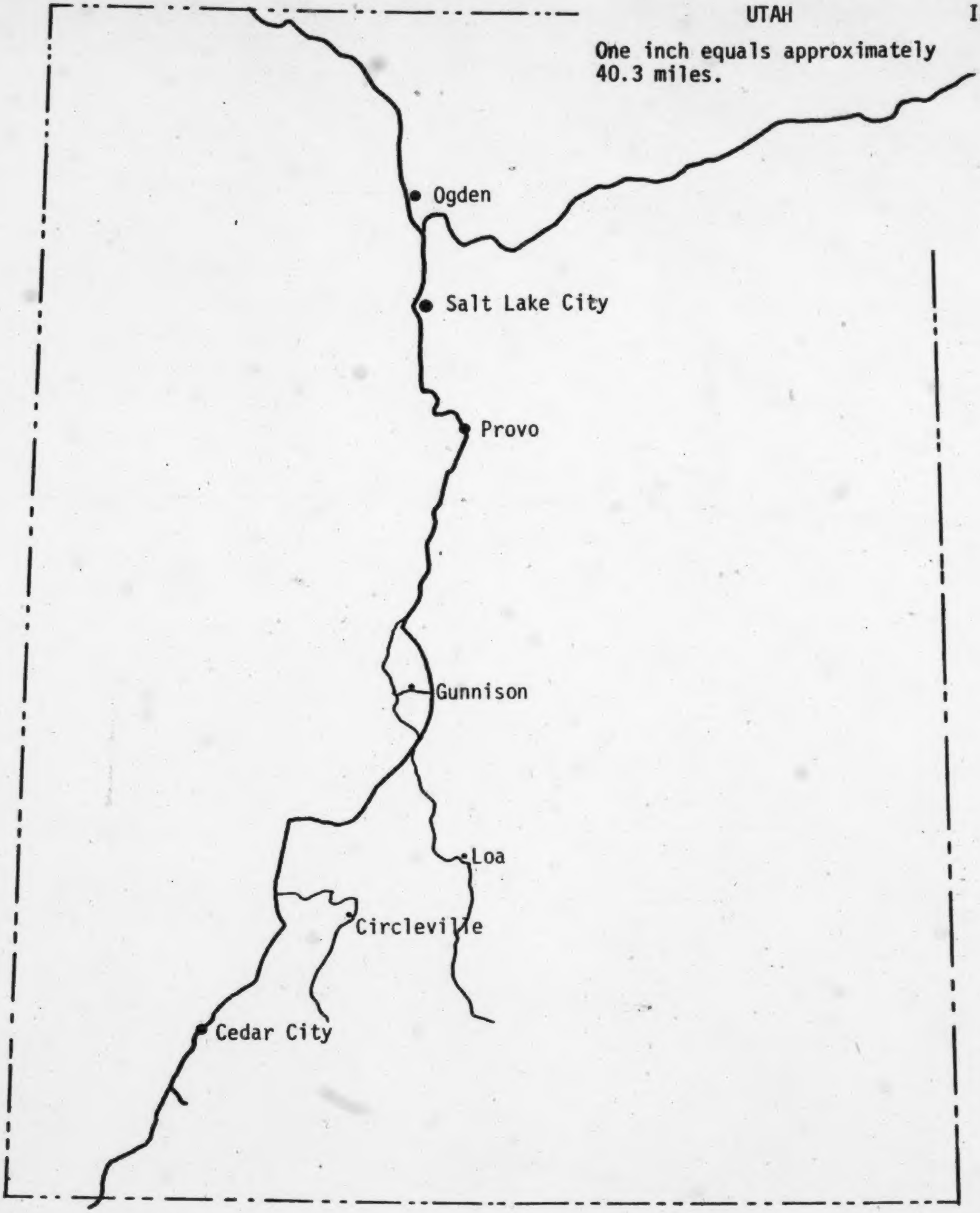
1. The organizational structure of any dairy co-operative needs to be tailored to legal and taxation criteria.
2. The degree to which the unit is a co-operative should be determined entirely by the preference of the shareholders. The important thing here is the extent to which the individual producer wants to associate or disassociate himself with the operation of the dairy.
3. The composition of the shareholders should not be restricted to farmers. Non-farmers and women should be encouraged to become involved.
4. Initial cattle procurement methods are of the utmost importance and must have due regard for production record and general health.
5. Mastitis detection, treatment and control is neglected at most of the dairy farms visited.
6. The optimum herd size is dependent upon management capabilities. But assuming management is available herds are economical up to 2,500 cows.
7. The standard 100-cow corral used in Utah is the maximum size for a single unit but it may be replicated as the herd expands.
8. The open type corral used in Utah is not sufficient protection in Alberta.
9. The use of semi-automatic and tailored milking equipment is required.
10. The major reasons for the formation of dairy co-operatives are:
    (a) exploiting economies of size and scale.
    (b) additional labor flexibility and specialization for the individual member.

    In terms of 100-cow herds the only gain from spreading of capital invested would be in the joint use of the milkhouse, milking parlor and equipment, since a 100-cow corral requires the same capital to build whether it is owned by an individual farmer or by a co-op. However, when herds of less than 100 cows are involved then there is a gain to be made in spreading the capital required to build the corrals as well as in the milking facility.

11. The flexibility of dairy co-op labor requirements enables a group of farmers to enjoy hours of work and fringe benefits comparable to urban labor, and this has long been a major issue with dairy farm labor. It is both reasonable and practical to give serious consideration to the employment of girls and/or women in the milking of the cows.

12. The U.S.U. Logan has a Utah State Beautification Program under which dairy farms are rated and recognized for outstanding performance in this industry.

One inch equals approximately 40.3 miles.


Ogden
Salt Lake City
Provo
Gunnison
Loa
Circleville
Cedar City

APPENDIX N

The following is a feasibility study prepared by Alberta Department of Agriculture Economists in consultation with Department Specialists. It is intended that the study will have general application throughout the province.

SUMMARY OF FEASIBILITY REPORT AND ASSUMPTIONS

The feasibility report was done for a group of producers who wish to start a 1,000 head co-op dairy in central Alberta as an Alberta Government sponsored pilot project.

This report was completed based on the following:

1. Assumptions as given on Pages 2, 3, and 4.
2. Information provided by Alberta Department of Agriculture Dairy Consensus Research Data Reports and other government reports.
3. Information provided by producers.
4. Information gathered from investigation of similar type dairies in southern Utah and central Arizona.
5. Current price trends.

The herd is to be established by buying 1,100 open heifers at breeding weight in year one and raising them to first lactation at which time the necessary facilities will be completed. This approach is taken to hopefully limit disease problems which may incur by bringing together mature herds of dairy cows and was the method advised by dairymen in the United States.

When establishing the dairy, it is hoped that the provincial government will provide professional experienced consultants to assist with the initial phases of the operation.

In year four, the feasibility study shows the co-op should be able to make full interest and principal payment and begin paying dividends to investors.

ASSUMPTIONS

1. The dairy co-op is to be financed with $200,000 investors' equity plus a $1,750,000 loan. Each member will be directly liable to the Alberta government for an amount equal to his initial investment, thus giving an equity position of $200,000 and a liability position of $400,000 by members.

   The loan of $1,750,000 is to be financed at 9% over 20 years with deferral of interest and principal payments for the first 3 years. The interest will be capitalized yielding a total debt of $2,075,000 to be retired over the remaining 17 years of the 20 year loan.

2. Milk price calculated at $8.35 per cwt. after dairy commission deduction and before transportion charges.

3. Total Feed Consumed Per Year:

   6,500 tons cereal silage
   3,800 tons of alfalfa-brome hay
   2,350 tons of prepared grain ration
   plus milk, concentrates, etc.

   Feed Prices:

   Hay cost calculated at %50.00 per ton
   Silage cost calculated at $20.00 per ton in pit
   Prepared grain ration costs calculated at $110.00 per ton

4. Long term loan and investors' equity required:

1,100 open heifers and incurred expenses	$557,500
Free stall housing	675,000
Polygon or similar automated milking parlor	140,000
Feed storage and developments	112,000
Basic feed and handling equipment	95,000
Purchase of subsidy eligibility quota	63,875
Land	48,000
Dry cow and replacement accommodations	40,000
Operating capital	242,375
TOTAL (includes approximately 10% contingency factor)	$1,973,750

First 3 years of interest $325,250

5. Labor Requirements:

Manager	$16,000 to $20,000
Assistant Manager (and Herdsman)	$10,000
Assistant to Herdsman	$8,000
Bookkeeper and Office Administration	$8,000
6 Milkers	$7,100 per man
3 Laborers for corral cleaning, feeding and relative herd duties	$7,100 per man

Cost of Labor Calculated at $110,000 Per Year

6. Replacements:

Heifer calf costs assume 10% death loss in first year and an additional 2% death loss in following year. It was further assumed that 196 heifer calves would be sold each year shortly after birth and that 254 would be raised for replacements. Feed and direct production cost per head per replacement calculated as follows over two year period:

-It was calculated that in year two and three replacements equal to 10% of total herd would have to be bought from outside sources.

Feed

600 lbs. milk at $6.70/cwt.	$26.80)	first year
30 lbs. of calf starter	$1.27)	
1,340 lbs. of prepared grain ration	$73.70)	
4,080 lbs. of alfalfa hay	$122.40)	
1,440 lbs. of prepared grain ration	$79.20)	second year
6,300 lbs. of alfalfa hay	$189.00)	
Total Feed Costs Per Head	$492.37	

Other Direct Production Costs:

Bedding	$15.00
A.I.	$12.00
Veterinary and Medicine	$10.00
Taxes and Utilities	$0.25
Miscellaneous	$2.00
TOTAL	$39.25/two years

Other costs such as equipment operating included on mature cow/head costs.

7. Dairy Cow Costs:

-Dairy herd costs were calculated on a 10% cull and death ratio in year two and a 25% cull ratio, including 3% death loss, from then on. It was assumed that herd would be started by buying 1,100 open heifers at approximate weight of 750 lbs. which would be bred and raised to freshening.

-Feed and direct production costs per head calculated as follows over one year period:

Feed:

6.5 tons cereal silage	$130.00
2.5 tons alfalfa-brome hay	$125.00
2 tons prepared grain ration	$220.00
Total Feed Cost Per Year	$475.00

Other Direct Production Costs:

Supplies	$12.50
Breeding	$11.00
Veterinary and Medicine	$15.00
D.H.I.A.	$1.50
Taxes and Insurance	$1.50
Utilities	$20.00
Bedding and Miscellaneous	$6.00
Machinery and Equipment Operating	$6.00
TOTAL	$73.50

Milk transportation costs were calculated at $0.40 per cwt.

8. Cow Numbers and Production:

It was assumed that during first year there would be no production. After year one, there would be a 1,000 head cow herd at all times. Production during year two was assumed to be 10,000 lbs. of milk per head, year three production was assumed to be 10,500 lbs. per cow, year four assumed production level of 11,500 lbs. per cow and from year five on it was assumed that herd production would be 12,000 lbs. per cow.

9. Bull Calves:

It was assumed that all bull calves would be sold shortly after birth for an average price of $75.00 per head.

10. Operating Capital:

Average yearly operating capital requirements calculated at $913,514 to be borrowed on term notes at 11.25% per year and retired in same year.

11. Interest Calculations:

Interest on feed calculated at 11.25% for one quarter year. Interest on other operating capital calculated at 11.25% for one half year.

CONSTRUCTION COSTS

	Least Cost Material	High Cost Material	Labor Cost
250 HEAD LOAFING BARN: 84' x 290'			
Material (lumber, Nails, etc.)	$45,066	$69,426	
Foundation	4,488	4,488	
Floor (Concrete)	10,962	10,962	
Insulation (1 in. styrofoam for roof)	7,500	7,500	
Ventilation	2,707	2,707	
Free Stalls	5,320	5,320	
Labor (Loafing Barn Construction)	32,000	32,000	$32,000
Excavation	5,413	5,413	
Trenching	935	935	
Manure Storage	5,000	5,000	
Feed Bunks	1,960	1,960	980
Feed Conveyor	8,400	8,400	4,200
TOTAL LOAFING BARN CONSTRUCTION COSTS	$129,751	$154,111	$37,180
TOTAL PER HEAD		$617.64	
COST FOR 800 HEAD		$494,115	
Allowance for additional feeding equipment, handling equipment, manure handling equipment, covered and paved alleys and contingent expenses		$180,885	
Total		$675,000	
Dry cow and calf accommodation		$40,000	
Feed Storage		$72,750	
Land Developments:			
160 acres @ $300/acre		$48,000	
Dugout Development and contingent expenses		$40,000	
Total		$88,000	

BASIC FEED AND HANDLING EQUIPMENT REQUIRED

30 - 40 ton scale installed	$11,000 - $12,000
Industrial front end loader (used)	19,000
2 feed wagons with scales ($10,750)	21,500
2 tractors 65 H.P. with unloader ($9,250)	18,500
Bob cat	7,000
Liquid Manure Wagon	3,000
Liquivator	2,700
Standby generator	1,300
	$85,000
Other miscellaneous equipment allowance	10,000
	$95,000

24 POINT POLYGON MILK PARLOUR - ESTIMATED COSTS

24 fully automated points @ $1,800 each	$43,200
Vacuum pump	3,000
Vacuum line	520
Vacuum line control guage	300
Milk pipeline with elbows, supports and pipe hangers	10,000
In line filters	336
Receiver tank and milk pump assembly	4,125
Plate heat exchanger	1,200
Sweet water unit with 2,000 lb. ice capacity complete with compressor and circulating pump	3,875
Milk storage tank - 6,000 gal. capacity	
5 H.P. compressor	1,200
Air compressor for crowd control gates	1,500
Fully automated washer	800
Wash tank	320
Subtotal	$95,376
Estimated milkhouse and parlour construction cost (136' x 44')	44,500
TOTAL	$139,876

CONSTRUCTION COSTS

	Least Cost Material	High Cost Material	Labor Cost
MILKHOUSE: 44' x 136'			
Material (Lumber, Nails, etc.)	$11,070	$17,054	
Foundation	2,160	2,160	
Floor (Concrete)	2,693	2,693	
Insulation	3,898	2,898	
Lineal Panel	1,512	1,512	
Ventilation	665	665	
Plumbing: (a) Hot Water Tank	490	971	
(b) Cold Water Tank	160	160	
(c) Pump - 1 H.P.	265	623	
(d) Water Pipes	50	75	
(e) Well (complete)	700	1,000	
(f) Sewage System (tank and drain pipes)	1,500	2,000	
(g) Labor (for plumbing)	1,800	3,600	$3,600
Labor (for milkhouse construction)	3,890	5,984	5,984
Excavation	1,329	1,329	
Trenching	450	450	
TOTAL MILKHOUSE CONSTRUCTION	$31,632	$43,174	$9,584

PRO FORMA FOR 1,000 HEAD DAIRY WITH DEFERRAL OF INTEREST AND PRINCIPAL PAYMENTS FOR FIRST THREE YEARS

Receipts:	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Sale of Milk$^{(3)}$	--	$835,000	$876,750	$960,250	$1,002,000	$1,002,000
Sale of Livestock	--	124,850	137,450	137,450	137,450	137,450
TOTAL		$959,850	$1,014,200	$1,097,700	$1,139,450	$1,139,450
Estimated Expenses:						
Feed	$295,000	$599,000	$599,000	$599,000	$599,000	$599,000
Labor	36,000	110,000	110,000	110,000	110,000	110,000
Direct Production Costs	49,900	83,500	83,500	83,500	83,500	83,500
Interest on Operating Capital	--	27,750	31,400	27,750	27,750	27,750
Replacements	522,500	--	65,000	--	--	--
Milk Transportation	--	40,000	42,000	46,000	48,000	48,000
Investment in Buildings and Facilities, Land, Equipment and Quota	148,000	1,022,000	4,375	8,750	4,375	--
Debt Retirement	--	--	78,925	246,000	248,800	248,800
TOTAL	$1,051,400	$1,822,250	$1,014,200	$1,121,000	$1,121,425	$1,117,050
Cash Balance	-$1,051,400	-$922,400	-	-$23,300	$18,025	$22,400
Monies Required for Investment	$1,051,400	$922,400	-			
Capitalized Interest	$76,650	$167,000	$81,600			
Total Debt	$2,099,000$^{(4)}$					

Debt Retirement @ 9% over 17 years $243,000

Production Level Assumed:
  10,000 lbs./head in yr. 2
  10,500 lbs./head in yr. 3
  11,500 lbs./head in yr. 4
  12,000 lbs./head in yr. 5 and 6

(1) Portion of yearly interest payment
(2) Full payment of amortized debt
(3) $8.50/cwt. less $0.15 holdback
(4) Total investment $2,299,000

** Average growth in owners' equity of approximately $55,000/year. Average return on owners' equity of 25%

APPENDIX O

The following feasibility study is a revision of Appendix N with some changes relating to rising costs of feed and some equipment.

SUMMARY OF DAIRY CO-OP FEASIBILITY REPORT

The feasibility report was done for a group of producers who wish to start a 1,000 head co-op dairy in Region 1 as an Alberta Government sponsored pilot project.

This report was completed based on the following:

1. Assumptions as given on Pages 2, 3 and 4.
2. Information provided by Alberta Department of Agriculture Dairy Consensus Research Data Reports and other government reports.
3. Information provided by producers.
4. Information gathered from investigation of similar type dairies in southern Utah and central Arizona.
5. Current price trends.

The total investment required for land, buildings, equipment and cattle is $1,590,000 and the total amount required by the dairy from investors and lending institutions during the first two years is $1,981,302.[1] Of this total amount, $200,000 will be provided as equity by investors and each member will be personally liable for another $10,000 on a government guaranteed certificate. The co-op will require loans amounting to $2,101,076[2] over twenty years and hope to acquire this loan at 7% interest for the first three years, then at a maximum of 9% interest for the remaining seventeen years. It is further requested that the government provide a deferral of interest and principal payment for the first three years and the debt will be retired over the remaining seventeen years.

The herd is to be established by buying 1,000 open heifers at breeding weight in year one and raising them to first lactation at which time the necessary facilities will be completed. This approach is taken to hopefully limit disease problems which they may incur by bringing together mature herds of dairy cows and was the method advised by dairymen in the United States.

When establishing the dairy, it is hoped that the provincial government will provide professional experienced consultants to assist with the initial phases of the operation.

In year four, the feasibility study shows the Co-op should be able to make full interest and principal payment and begin paying dividends to investors.

SUMMARY OF ASSUMPTIONS

1. Dairy co-op is to be financed with $200,000 equity by investors at 7% interest for first three years with a principal and interest deferral. The debt is to be retired over the remaining seventeen years at an interest rate of 9%.

2. Milk price calculated at $9.41 per cwt. before dairy commission deduction and before transportation charges.

3. Feed Prices: Hay costs calculated at $65 per ton
Silage costs calculated at $20 per ton in pit
Barley price calculated at $130 per ton for prepared grain ration.

Total Feed Consumption per year: 6,900 tons of corn silage
3,298 tons of alfalfa hay
2,348 tons of prepared grain ration plus milk, concentrates, etc.

4. Long term loan and investors' equity required by dairy co-ops in first two years:

$475,000	for open heifers and incurred expenses
$325,253	for first year operating capital required to raise heifers to first lactation
$ 21,877	for portion of cost of replacements required in year two
$100,000	for land and developments
$ 84,875	for purchase of subsidy eligibility quota
$675,000	for free stall housing
$ 40,000	for dry cow and replacement accommodations
$ 95,000	for facilities, feed and handling equipment and contingent expenses
$140,000	for polygon type milking parlor and all hardware
$319,194	interest accumulated over first 3 years which is capitalized
$2,276,199	Total: Includes approximately 10% contingency factor

5. Labor Requirements:

Manager	$16,000 to $20,000
Assistant Manager (and Herdsman)	$10,000
Assistant to Herdsman	$ 8,000
Bookkeeper and Office Administration	$ 8,000
6 Milkers	$ 7,100 per man
3 Laborers for corral cleaning, feeding and relative herd duties	$ 7,100 per man

Cost of Labor calculated at $110,000 per year

6. Replacements

Heifer calf costs assume 10% death loss in first year and an additional 2% death loss in following year. It was further assumed that 196 heifer calves would be sold each year shortly after birth and that 254 would be raised for replacements. Feed and direct production cost per head per replacement calculated as follows over two year period:

It was calculated that in year two and three replacements equal to 10% of total herd would have to be bought from outside sources.

Feed:

600 lbs. milk at $6.70 cwt.	$ 26.80)	
30 lbs. of calf starter	$ 1.27)	
1,340 lbs. of prepared grain ration	$ 87.10)	first year
4,080 lbs. of alfalfa	$132.60)	
1,440 lbs. of prepared grain ration	$ 93.60)	
6,300 lbs. of alfalfa hay	$204.75)	second year
Total Feed Costs per Head	$546.12	

Other Direct Production Costs:

Bedding	$ 15.00
A.I.	$ 12.00
Veterinary and Medicine	$ 10.00
Taxes and Utilities	$ 0.25
Miscellaneous	$ 2.00
Total	$ 39.25/two years

Other costs such as equipment operating included on mature cow/head costs.

7. Dairy Cow Costs:

Dairy Herd costs were calculated on a 10% cull and death ratio in year two and a 25% cull ratio, including 3% death loss, from then on. It was assumed that herd would be started by buying 1,000 open heifers at approximate weight of 750 lbs. which would be bred and raised to freshening.

Feed and direct production costs per head calculated as follows over one year period.

Feed:

6.9 tons corn silage	$138.00
2 tons alfalfa	$130.00
2 tons prepared grain ration	$260.00
Total Feed Cost per year	$528.00

Other Direct Production Costs:

Supplies	$12.50
Breeding	$11.00
Veterinary and Medicine	$15.00
D.H.I.A.	$ 1.50
Taxes and Insurance	$ 1.50
Utilities	$20.00
Bedding and Miscellaneous	$ 6.00
Machinery and Equipment Operating	$ 6.00
Total	$73.50

Milk transportation costs were calculated at $0.50 per cwt.

8. Cow Numbers and Production:

It was assumed that during first year there would be no production. After year one, there would be a 1,000 head cow herd at all times. Production during year two was assumed to be 10,000 lbs. of milk per head, year three production was assumed to be 10,500 lbs. per cow, year four assumed production level of 11,500 lbs. per cow and from year five on it was assumed that herd production would be 12,000 lbs. per cow.

9. Bull Calves:

It was assumed that all bull calves would be sold shortly after birth for an average price of $75.00 per head.

10. Operating Capital:

Average yearly operating capital requirements calculated at $913,514 to be borrowed on term notes at 9 1/2% per year and retired in same year.

11. Interest Calculations:

Interest on feed calculated at 12% for 1/4 year.

Interest on other operating capital calculated at 12% for 1/2 year.

SUMMARY OF DAIRY CO-OP FEASIBILITY REPORT

The feasibility report was done for a group of producers who wish to start a 1,000 head co-op dairy in Region 1 as an Alberta Government sponsored pilot project.

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[1] See Assumption 4 of Feasibility Report.

[2] Includes accumulated interest.

When establishing the dairy, it is hoped that the provincial government will provide professional experienced consultants to assist with the initial phases of the operation.

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Veterinary and Medicine	$ 10.00
Taxes and Utilities	$ 0.25
Miscellaneous	$ 2.00
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2 tons prepared grain ration	$260.00
Total Feed Cost per year	$528.00

Other Direct Production Costs:

Supplies	$12.50
Breeding	$11.00
Veterinary and Medicine	$15.00
D.H.I.A.	$ 1.50
Taxes and Insurance	$ 1.50
Utilities	$20.00
Bedding and Miscellaneous	$ 6.00
Machinery and Equipment Operating	$ 6.00
Total	$73.50

Milk transportation costs were calculated at $0.50 per cwt.

8. Cow Numbers and Production:

It was assumed that during first year there would be no production. After year one, there would be a 1,000 head cow herd at all times. Production during year two was assumed to be 10,000 lbs. of milk per head, year three production was assumed to be 10,500 lbs. per cow, year four assumed production level of 11,500 lbs. per cow and from year five on it was assumed that herd production would be 12,000 lbs. per cow.

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11. Interest Calculations:

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Interest on other operating capital calculated at 12% for 1/2 year.

PRO FORMA FOR 1,000 HEAD DAIRY WITH DEFERRAL OF INTEREST AND PRINCIPAL PAYMENT FOR FIRST THREE YEARS

	Loan at 7%			Loan at 9%		
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Cash Receipts:						
Sale of Milk(3)	--	$920,000	$966,000	$1,058,000	$1,104,000	$1,104,000
Sale of Livestock	--	87,050	137,450	137,450	137,450	137,450
		$1,007,050	$1,103,450	$1,195,450	$1,241,450	$1,241,450
Estimated Expenses:						
Feed(4)	$268,200	$665,000	$665,000	$665,000	$665,000	$665,000
Labor	36,000	110,000	110,000	110,000	110,000	110,000
Direct Production Costs	45,350	83,315	83,315	83,315	83,315	83,315
Interest on Operating Capital	4,881	29,631	33,537	29,634	29,634	29,634
Replacements	475,000	65,000	65,000	--	--	--
Milk Transportation	--	50,000	52,500	57,500	60,000	60,000
Investment in Buildings and Facilities, Land, Equipment, and Quota	140,000	994,875	4,375	8,750	4,375	--
Debt Retirement*	--	--	--	215,633	215,633	215,633
TOTAL	$969,431	$1,997,821	$1,013,727	$1,169,832	$1,167,957	$1,163,582
Cash Balance	- $969,431	$1,997,821	$89,723	$25,618	$73,493	$77,868
Monies Required for Investment	$969,431	$990,771				
Yearly Interest Due	$53,860	$128,461	$135,873			
Total Loan Plus Capitalized Interest(5)			$2,076,919			

Production Level Assumed:
- 10,000 lbs./head in Year 2
- 10,500 lbs./head in Year 3
- 11,500 lbs./head in Year 4
- 12,000 lbs./head in Year 5 and 6

(2) Full retirement payment of amortized debt
(3) $9.41 less deductions
(4) Based on $65/ton alfalfa
(5) Total investment $2,276,919
(6) $200,000 of investors' equity
* Loan at 7% for 3 years + 9% for remaining 17 years

PRO FORMA FOR 500 HEAD DAIRY WITH DEFERRAL OF INTEREST AND PRINCIPAL PAYMENT FOR FIRST THREE YEARS

August, 1974

	Loan at 7%			Loan at 9%		
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Cash Receipts:						
Sale of Milk(3)	--	$460,000	$471,982	$529,000	$552,110	$552,110
Sale of Livestock	--	43,525	68,725	68,725	68,725	68,725
TOTAL		$503,525	$540,707	$597,725	$620,835	$620,835
Estimated Expenses:						
Feed(4)	$134,100	$332,500	$332,500	$332,500	$332,500	$332,500
Labor	36,000	72,600	72,600	72,600	72,600	72,600
Direct Production Costs	22,675	41,660	41,660	41,660	41,660	41,660
Interest on Operating Capital	2,440	15,165	17,307	20,301	20,301	20,301
Replacements	237,500	32,500	32,500	--	--	--
Milk Transportation	--	25,000	26,250	28,750	30,000	30,000
Investment in Buildings and Facilities, Land, Equipment and Quota	110,000	497,500	2,190	4,380	2,190	--
Debt Retirement*	--	--	--	105,870	105,870	105,870
TOTAL	$542,715	$1,016,925	$525,007	$606,061	$605,121	$602,931
Accumulated Cash Position	- $542,715	- $513,400	$15,700	- $8,336	$15,714	$17,904
Monies Required for Investment	$542,715	$513,400				
Yearly Interest Due	$23,990	$63,345	$66,709			
Total Loan Plus Capitalized Interest(5)		$1,019,709				

Production Level Assumed:
10,000 lbs./head in Year 2
10,500 lbs./head in Year 3
11,500 lbs./head in Year 4
12,000 lbs./head in Year 5 and 6

(2) Full amortized payment of debt
(3) $9.41 less holdback
(4) Based on $60/ton alfalfa
(5) Total investment $1,219,709; Total loan $1,019,709
Total reduced by $200,000 of investors' equity
* Loan at 7% for 3 years + 9% for remaining 17 years

APPENDIX P

The following is General Considerations and Suggested Policy of the Alberta Department of Agriculture relative to the Alberta Milk Yard Program and the Dairy Cooperative Program. It was recommended for approval on June 24, 1974 by the Alberta Deputy Minister of Agriculture, and was signed by both the Deputy and the Minister of Agriculture, Dr. Hugh Horner on the same day.

The policy and considerations were developed over a period of six months by a group of specialists within the Department of Agriculture.

ALBERTA DEPARTMENT OF AGRICULTURE

DAIRY CO-OP PROGRAM

GENERAL CONSIDERATIONS
AND SUGGESTED POLICY

PREPARED BY:

M. M. Galts
Regional Economist, A.D.A

L. Owen
Economist, A.D.A.

GENERAL CONSIDERATIONS AND SUGGESTIONS FOR ALBERTA GOVERNMENT DAIRY CO-OP PILOT PROJECTS

i In view of present milk shortage, the Alberta Government has indicated its support to the dairy co-op concept, and a desire to initiate pilot projects to assess this alternative as a means of expansion.
As pilot project operations should be established with variations in housing, milking systems, handling systems, type of initial herd and other management alternatives, under discretion of Dairy Branch or an Alberta Dairy Co-op Team.
Under the above format, pilot projects would have an applied research value giving Alberta Department of Agriculture staff and Canadian Dairymen the opportunity to accurately assess different types of large dairy operations under Canadian economic conditions and varying regional conditions.

ii Due to variations in feed prices, livestock and other inputs, as well as unprecedented expenditures, the loan approval and disbursement of funds should allow flexibility.
Policy should be comparable to the following suggestions:

(a) Disbursement of funds based on total expenditures during first two (2) years of operation and proposed capital expenditures beyond that point.

(b) A maximum loan of two (2) million dollars to be disbursed upon documentation of expenditure.

iii Pilot projects will result in additional risk to participating producers due to a lack of local examples and experience. In view of this and present high interest rates, a maximum interest rate of 9% should be applied to the project and the balance (if any) paid by The Alberta Department of Agriculture for a period of four (4) years.

iv Projects should have an equity position of 10% by members with an additional 10% personal liability for loan, giving 20% liability by members. The above terms are suggested to encourage participation of smaller farmers. Additional equity requirements would put excessive demands on many of the individual's financial situation, resulting in the loss of small farm members, who require this expansion opportunity.
At the same time the number of participants should be restricted to a level which assures commitment and worthwhile opportunity.

v A waiver of interest is not required by the co-op, but a deferral of interest and principal payments is essential. The alternatives to raising heifers and deferral allowances are:

(a) provision of an additional $330,000 working capital to be used for interest payments over first three years of operation, or

(b) purchasing of a mature herd, which would require an additional $330,000

(a) provision of an additional $330,000 working capital to be used for interest payments over first three years of operation, or

(b) purchasing of a mature herd, which would require an additional $330,000 initial investment and a one year deferral of principal payment.

vi Short payback periods will result in a distribution of profit with a high gain in equity but a negative cash flow. Ten year terms and present interest rates yield a negative cash flow of approximately $150,000.

High interest rates will place unreasonable demands on the productive earnings of any agricultural enterprise; most agricultural enterprises require a land base and therefore, will have a substantial portion of total investment financed at reduced government interest rates (A.D.C. direct loan at 7%).

This enterprise requires a large investment to form a dairy herd which will retain it's value (similar to land) throughout the life of the project; therefore, it would be reasonable to consider the same financing on a herd as on land.

vii If no change occurs in Federal regulations, provision for payment on value of production not eligible for Federal subsidy payments, of $222,000, must be provided.

viii Consulting and experienced management personnel are essential to avoid costly problems. Provision of government funding for consulting fees should be an additional benefit to pilot projects with a cost of approximately $5,000 per unit.

SUGGESTED POLICY FOR PILOT PROJECTS

(1) Suggest that four to five projects be initiated throughout the province over a period of two to three years.

(2) Program should allow flexibility, to allow instigation of internal production alternatives, with a maximum of two (2) million dollars borrowed capital.

(3) Present 10% equity plus personal guarantee by participating producers for additional 10%.

(4) No interest waiver--but interest and principal deferrment based on needs of specific operation.

(5) Government provision of consultant fees for expertise and assistance to pilot projects.

(6) Terms for financing allowing adequate liquidity with maximum of government assistance.

Either of the following terms for financing:

ALTERNATIVE ONE:

50% of loan (1 million dollars) as direct loan from A.D.C. at 7% over 20 years and 50% of loan on A.D.C. Guaranteed note with 15 years repayment at a maximum of 9% interest rate with difference (if any) paid by government for first four (4) years. Result: approximate breakeven cash flow.*

ALTERNATIVE TWO:

Total of two (2) million dollars on A.D.C. Guaranteed Loan with a maximum interest rate of 9% for 10 years (market interest after 10 years) with repayment over 20 years. Result is approximate $25,000 positive cash flow.**

Any terms requiring higher interest rates or shorter terms of debt retirement would result in a negative cash flow and would probably eliminate producers interest in the project.

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* See attached Summary of Cash Position A

** See attached Summary of Cash Position B

COST TO GOVERNMENT

(1) Assume - Average 11% interest rate for first four (4) years and effective rate of 9% interest after four (4) years to ten (10) years.

$1 million A.D.C. Guaranteed Loan

9% maximum interest, but 11% effective

Cost 1 year = 2% of one million

$20,000 per year

TOTAL COST (4 years) *$80,000

$2 million A.D.C. Guaranteed Loan

9% maximum interest

Cost per 1 year $40,000

Cost first 4 years $16,000

Cost remaining 6 years-------

TOTAL DIRECT COST TO GOVERNMENT (10 years) $160,000

* COST of 7% A,D,C, funds not considered

AGGREGATE BENEFIT TO ALBERTA

i	Additional Yearly Agricultural Revenue	$1.1 million
ii	Effective increase in Value of Provincial Gross Production approximate	$3.9 million
iii	Direct return to Province (taxation) approximate Additional Revenue and Benefit	$40,000 1 year +

(1) Assumes feed consumed is in addition to current level of production in Alberta.

(2) Multiplier effect of 3.5 to 1
(value of manufactured milk product sold relative to cost of milk)

(3) Assumes 10% net taxable at 20% rate.

CONSIDERATIONS FOR SMALLER OPERATIONS

A. Smaller operation (i.e. 500 herd) would be covered under general guidelines of Dairy Co-op policy and evaluation of size could be stipulated as one of tne program's objectives.

B. A smaller well planned operation would undoubtedly be feasable but following disadvantages should be given consideration:

(i) With a lower investment and the same number of participants, there would be smaller return to each member which may result in less individual commitment.

(ii) Smaller operations will not enjoy same economies of scale with regard to:

(a) management cost (same quality of management will be required)
(b) labour specialization
(c) milking cost
(d) lowered investment per head, and
(e) may result in fewer employee benefits

(iii) If expansion is to be facilitated the smaller operation must either carry excess investment in milking facilities or carry out a unit expansion which would yield same milking cost per head, which would be higher than that of facilities planned for larger operations. (i.e. 2 double 10 parlors milking 1000 cows = cost per head greater than cost per head with one 24 point polygon milking 1000 head)

C. Possibility exists that producers in Alberta would expand their operations to the 350 to 500 head level, if production regulation would allow expansion without government incentives.

---Feasability report to follow.

A

SUMMARY OF CASH POSITION - ALBERTA DAIRY CO-OPS

(assume interest deferral for first 3 years - calculations assume land and buildings @ 7% over 20 years)

Interest Rate and Terms of Repayment on (4) Guaranteed Loan		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	
	Yearly Cash Available for Debt servicing				$213,600	$257,200	$261,600	$261,600	
9% over 10 yrs.	Total Annual Payment (1)	-Interest Deferred-------------			$318,700	$331,500	$331,500	$331,500	10 years
	CASH SURPLUS			$55,360(3)	-$105,100	- $61,500	-$57,100	-$57,100	
PROPOSED FINANCING									
9% over 15 yrs.	Total Annual Payment(1)	-Interest Deferred-------------			$257,500	$270,400	$270,400	$270,400	15 years
	CASH SURPLUS			$55,360	-$43,900	-$300	-$4,100	-$4,100	
12% over 10 yrs.	Total Annual Payment(2)	-Interest Deferred-------------			$370,400	$370,400	$370,400	$370,400	10 years
	CASH SURPLUS			$55,360	-$156,800	-$113,200	-$108,800	-$108,800	
12% over 15 yrs.	Total Annual Payment(2)	-Interest Deferred-------------			$316,000	$316,000	$316,000	$316,000	15 years
	CASH SURPLUS			$55,360	-$102,400	-$58,000	-$54,400	-$54,400	

NOTE: Amortized payments result in increased equity in cattle and land of approximately $104,000 per year over 10 years and $71,000 per year over 15 years.

(1) Total accumulated debt ($2,140,000) amortized - does not include approximately $150,000 required for working capital annually.
(2) Total accumulated debt ($2,345,600) amortized - does not include approzimately $150,000 required for working capital annually.
(3) Cash surplus in year 3 required for working capital and unforeseen expenditures. Reduced from attached feasibility due to present high interest rate on short term working capital.
(4) Guaranteed loan on livestock, machinery and operating capital.

B

SUMMARY OF CASH POSITION - ALBERTA DAIRY CO-OPS

(assumes deferred interest for first 3 years in all cases - deferred interest and debt amortized over last 17 years)

Interest Rate		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	
	Deferred interest amortized at 7% (1)	-Interest at 7% Deferred to Year 4-			$32,500				
7%	Debt Amortized at 7%				$181,300(2)				
	Total Annual Payments - 7%	-Interest at 7% Deferred to Year 4-			$213,800	$213,800	$213,800	$213,800	
	CASH SURPLUS AT 7%			$55,360(6)	-$300	$43,400	$47,700	$47,700	Comparable return projected for balance of years
8%.	Total Annual Payments - 8%	-Interest at 8% Deferred to Year 4-			$234,100(3)	$234,100	$234,100	$234,100	
PROPOSED FINANCING	CASH SURPLUS AT 8%			$55,360	-$20,600	$23,100	$27,400	$27,400	
9%	Total Annual Payments - 9%	Interest at 9% Deferred to Year 4-			$255,900(4)	$255,900	$255,900	$255,900	
	CASH SURPLUS AT 9%			$55,360	-$42,400	$1,300	$5,600	$5,600	
11%	Total Annual Payments - 11%	-Interest at 11% Deferred to Year 4-			$302,700(5)				
	CASH SURPLUS AT 11%			$55,360	-$89,700	-$46,700	-$42,700	-$42,700	

NOTE: Amortized payments result in increased equity in cattle and land of approximately $55,000 per year.
Feed costs reduced by 10% ($2.20 barley and alfalfa at $50 per ton) increases net earnings by $60,000 per year.

(1) Accumulated interest for first 3 years ($317,800) amortized at 7% for 17 years

(2) Total accumulated debt ($1,770,200) amortized at 7% for 17 years - does not include approximately $150,000 required for working capital annually.

(3) Total accumulated debt ($2,136,200) amortized at 8% for 17 years - does not include approximately $150,000 required for working capital annually.

(4) Total accumulated debt ($2,185,000) amortized at 9% for 17 years - does not include approximately $150,000 required for working capital annually.

(5) Total accumulated debt ($2,284,800) amortized at 11% for 17 years - does not include approximately $150,000 required for working capital annually.

(6) Cash surplus in year 3 required for working capital and unforeseen expenditures. Reduced from attached feasibility due to present high interest rate on short term working capital.

APPENDIX Q

FEED COSTS/MILK PRICES

The feed cost/milk price ratio is one of the major management concerns in dairying. As the ratio changes the management decisions become crucial to feed purchases and formulations. The range of feed prices in Alberta during 1973 was extreme. The Alberta Dairy Farm Business Summaries record the following variations in feed prices during 1973.

Variations in Home Grown and Purchased Feed Prices in Alberta 1973

		Home Grown Range	Purchased Range
		(dollars per bushel)	
Edmonton	Oats	0.70 - 1.30	0.70 - 1.64
	Barley	0.96 - 2.23	0.96 - 2.75
Calgary	Oats	0.73 - 1.35	0.73 - 1.64
	Barley	0.99 - 2.24	1.00 - 2.80
Lethbridge	Oats	0.77 - 1.50	0.70 - 1.64
	Barley	0.99 - 2.32	0.99 - 2.80

Source: Marketing Division, Alberta Department of Agriculture. Dairy Farm Business Summaries, Preliminary Estimates 1973.

Variation of such a magnitude (almost triple) in factor prices over such a short period of time is critical in the management of a dairy farm. The following article and tables are helpful in this regard.

Adapting to Feed and Milk Price Variations

by

Dr. George E. Stoddard
Utah State University
Logan, Utah

October, 1973

Fluctuations in feed prices and milk values make it difficult for dairymen to know how to manage for the greatest economic return. The problems are confounded because of considerable variations in quality of feed even when grown on the same farm. Chemical analyses of feeds provide guidelines for feed quality, but must be used with judgment.

Tables of milk value above feed cost for a range of hay, grain and milk values are provided as guidelines for dairymen. They are simplified so that they may be readily understood, but may necessitate some interpolation for costs and values not specifically tabulated. Other feeds may be substituted on the basis of their comparative energy value.

Level of milk production is inclined in the tables to provide guidelines for amounts of feed to be provided. They generally follow a guideline of grain consumed at the rate of one pound daily for each two pounds of milk above twenty pounds. Hay fed free choice will provide the approximate intakes shown. As an illustration of variation, an extra column for 40 pounds of milk is included for a reduced hay intake and additional grain provided. A guideline for substitution is two pounds of grain is approximately equivalent to three pounds of hay.

When silage (corn of hay crop) is fed, each pound of hay is equivalent to 2 1/2 to 3 pounds of silage. For 50% moisture haylage the substitution rate is about one of hay to two pounds of haylage.

To illustrate the use of the tables, assume a herd of cows averaging 40 pounds of milk daily per milking cow and with hay selling for $50 per ton, grain for $80 per ton and milk for $7 per cwt. The return above feed cost is $1.67 per cow daily as shown on Table 4 for the normal hay-grain intake. With these prices, substituting grain for hay would not be economical as shown in the next column with only $1.62 return over feed cost.

Increasing production to 45 pounds daily would increase return above feed cost to $1.93, whereas, a decline in production to 35 pounds would reduce the return to $1.42. The importance of production level is quite apparent.

If grain costs increase to $90 per ton, the return above feed cost would be reduced to $1.62 for the 40 pound level of production and normal hay-grain intake. If hay price increased to $55 per ton (table 5) and grain remained at $80, return over feed cost would be reduced to $1.60 and substituting grain for hay had only a one cent effect on returns over feed cost.

To interpolate between tabulated values, necessitates merely a rough estimation. For example, if in our illustration of a herd producing 40 pounds of milk and fed $50 hay and $80 grain (table 4), if milk value was $7.25 per cwt., the return over feed cost would be $1.77. The milk price being midway between $7 and $7.50 would place the return above feed cost midway between the $1.67 for $7.00 milk and the $1.87 for $7.50 milk. If milk had a value of $7.15 in this same illustration, return over feed cost would have been $1.73 (15/50 of the difference between $1.67 and $1.87, added to $1.67.

Non feed costs

Calculations for return over feed costs provide guidelines for relative returns for variations in prices of feed and milk but do not tell dairymen what their total economic status might be. Costs of operating a dairy herd vary considerably with herd size, quality of management, type of facilities, type and amount of finance and many other factors. As a guideline for those dairymen who do not know their own costs, tables of estimated costs are presented.

Table 7 includes an estimate of investment costs which may be typical for the intermountain area during the 1973 summer season. Costs are adequate for an efficient modern system but do not include cost of land or land development. They are restricted to the cow operation with calf-heifer or farming operations considered as separate enterprises.

Investment costs are combined with other non-feed costs in table 8. Values on the lower line are those which may be used with tables 1-6 for estimating the relation of return over feed cost to return over all costs. Dairymen with sufficient records to identify their own costs will find them more accurate than estimates in these tables, which do not include variations among dairymen. For example, labor costs for dairy herds in the region range from $93 to $170 in herds with records, whereas $120 per cow yearly is used in table 8.

For a herd of 120 cows, return above feed cost for the previously used example (using table 4) with $50 hay, $80 grain and 40 pound level of production, milk price would need to be near $6.50 to break even. At 30 pound level of production, the milk price would need to be between $7.50 and $8.00 per cwt. At 45 pounds average production, there should be a profit even at $6.00 - $6.50 for milk, even if grain increased to $100 per ton and hay remained at $50.

For a herd of 30 cows, non-feed costs are $1.66, 26 cents more daily per cow than for a 120-cow herd. Reduction of non-feed costs for increased herd size above 120 cows is at a slower rate than increasing herd size to 120 cows. Estimates for size of herds between the examples, should be on a proportionate basis, using the tables as illustrated.

Return over feed cost for milk production

		Milk, lbs. daily	20	30	35	40	40	45	50	60
		Hay, lbs. daily	31	30	30	29	15	28	26	24
		Grain, lbs. daily	0	5	7	10	20	13	16	22
Hay $/T	Grain $/T	Milk $/cwt								
35	60	6.50	.76	1.27	1.54	1.79	1.74	2.05	2.31	2.82
		7.00	.86	1.42	1.72	1.99	1.94	2.27	2.56	3.12
		7.50	.96	1.57	1.89	2.19	2.14	2.50	2.81	3.42
		8.00	1.06	1.72	2.07	2.39	2.34	2.72	3.06	3.72
		8.50	1.16	1.87	2.24	2.59	2.54	2.95	3.31	4.02
		9.00	1.26	2.02	2.42	2.79	2.74	3.17	3.56	4.32
		9.50	1.36	2.17	2.59	2.99	2.94	3.40	3.81	4.62
		10.00	1.46	2.32	2.77	3.19	3.14	3.62	4.06	4.92
	70	6.50	.76	1.24	1.51	1.74	1.64	1.98	2.23	2.71
		7.00	.86	1.39	1.68	1.94	1.84	2.21	2.48	3.01
		7.50	.96	1.54	1.86	2.14	2.04	2.43	2.73	3.31
		8.00	1.06	1.69	2.03	2.34	2.24	2.66	2.98	3.61
		8.50	1.16	1.84	2.21	2.54	2.44	2.88	3.23	3.91
		9.00	1.26	1.99	2.38	2.74	2.64	3.11	3.48	4.21
		9.50	1.36	2.14	2.56	2.94	2.84	3.33	3.73	4.51
		10.00	1.46	2.29	2.73	3.14	3.04	3.56	3.98	4.81
	80	6.50	.76	1.22	1.47	1.69	1.54	1.92	2.15	2.60
		7.00	.86	1.37	1.65	1.89	1.74	2.14	2.40	2.90
		7.50	.96	1.52	1.82	2.09	1.94	2.37	2.65	3.20
		8.00	1.06	1.67	2.00	2.29	2.14	2.59	2.90	3.50
		8.50	1.16	1.82	2.17	2.49	2.34	2.82	3.15	3.80
		9.00	1.26	1.97	2.35	2.69	2.54	3.04	3.40	4.10
		9.50	1.36	2.12	2.52	2.89	2.74	3.27	3.65	4.40
		10.00	1.46	2.27	2.70	3.09	2.94	3.49	3.90	4.70
	90	6.50	.76	1.19	1.44	1.64	1.44	1.85	2.07	2.49
		7.00	.86	1.34	1.61	1.84	1.64	2.08	2.32	2.79
		7.50	.96	1.49	1.79	2.04	1.84	2.30	2.57	3.09
		8.00	1.06	1.64	1.96	2.24	2.04	2.53	2.82	3.39
		8.50	1.16	1.79	2.14	2.44	2.24	2.75	3.07	3.69
		9.00	1.26	1.94	2.31	2.64	2.44	2.98	3.32	3.99
		9.50	1.36	2.09	2.49	2.84	2.64	3.20	3.57	4.29
		10.00	1.46	2.24	2.66	3.04	2.84	3.43	3.82	4.59
	100	6.50	.76	1.17	1.41	1.59	1.34	1.79	1.99	2.38
		7.00	.86	1.32	1.58	1.79	1.54	2.01	2.24	2.68
		7.50	.96	1.47	1.76	1.99	1.74	2.24	2.49	2.98
		8.00	1.06	1.62	1.93	2.19	1.94	2.46	2.74	3.28
		8.50	1.16	1.77	2.11	2.39	2.14	2.69	2.99	3.58
		9.00	1.26	1.92	2.28	2.59	2.34	2.91	3.24	3.88
		9.50	1.36	2.07	2.46	2.79	2.54	3.14	3.49	4.18
		10.00	1.46	2.22	2.63	2.99	2.74	3.36	3.74	4.48
	110	6.50	.76	1.14	1.37	1.54	1.24	1.72	1.91	2.27
		7.00	.86	1.29	1.55	1.74	1.44	1.95	2.16	2.57
		7.50	.96	1.44	1.72	1.94	1.64	2.17	2.41	2.87
		8.00	1.06	1.59	1.90	2.14	1.84	2.40	2.66	3.17
		8.50	1.16	1.74	2.07	2.34	2.04	2.62	2.91	3.47
		9.00	1.18	1.80	2.17	2.47	2.20	2.78	3.10	3.71
		9.50	1.28	1.95	2.34	2.67	2.40	3.00	3.35	4.01
		10.00	1.38	2.10	2.52	2.87	2.60	3.23	3.60	4.31

Return over feed cost for milk production

		Milk, lbs. daily	20	30	35	40	40	45	50	60
		Hay, lbs. daily	31	30	30	29	15	28	26	24
		Grain, lbs. daily	0	5	7	10	20	13	16	22
Hay $/T	Grain $/T	Milk $/cwt								
40	60	6.50	.68	1.20	1.47	1.72	1.70	1.98	2.25	2.76
		7.00	.78	1.35	1.64	1.92	1.90	2.20	2.50	3.06
		7.50	.88	1.50	1.82	2.12	2.10	2.43	2.75	3.36
		8.00	.98	1.65	1.99	2.32	2.30	2.65	3.00	3.66
		8.50	1.08	1.80	2.17	2.52	2.50	2.88	3.25	3.96
		9.00	1.18	1.95	2.34	2.72	2.70	3.10	3.50	4.26
		9.50	1.28	2.10	2.52	2.92	2.90	3.33	3.75	4.56
		10.00	1.38	2.25	2.69	3.12	3.10	3.55	4.00	4.86
	70	6.50	.68	1.17	1.43	1.67	1.60	1.91	2.17	2.65
		7.00	.78	1.32	1.61	1.87	1.80	2.14	2.42	2.95
		7.50	.88	1.47	1.78	2.07	2.00	2.36	2.67	3.25
		8.00	.98	1.62	1.96	2.27	2.20	2.59	2.92	3.55
		8.50	1.08	1.77	2.13	2.47	2.40	2.81	3.17	3.85
		9.00	1.18	1.92	2.31	2.67	2.60	3.04	3.42	4.15
		9.50	1.28	2.07	2.48	2.87	2.80	3.26	3.67	4.45
		10.00	1.38	2.22	2.66	3.07	3.00	3.49	3.92	4.75
	80	6.50	.68	1.15	1.40	1.62	1.50	1.85	2.09	2.54
		7.00	.78	1.30	1.57	1.82	1.70	2.07	2.34	2.84
		7.50	.88	1.45	1.75	2.02	1.90	2.30	2.59	3.14
		8.00	.98	1.60	1.92	2.22	2.10	2.52	2.84	3.44
		8.50	1.08	1.75	2.10	2.42	2.30	2.75	3.09	3.74
		9.00	1.18	1.90	2.27	2.62	2.50	2.97	3.24	4.04
		9.50	1.28	2.05	2.45	2.82	2.70	3.20	3.59	4.34
		10.00	1.38	2.40	2.62	3.02	2.90	3.42	3.74	4.64
	90	6.50	.68	1.12	1.36	1.57	1.40	1.78	2.01	2.43
		7.00	.78	1.27	1.54	1.77	1.60	2.01	2.26	2.73
		7.50	.88	1.42	1.71	1.97	1.80	2.23	2.51	3.03
		8.00	.98	1.57	1.89	2.17	2.00	2.46	2.76	3.33
		8.50	1.08	1.72	2.06	2.37	2.20	2.68	3.01	3.63
		9.00	1.18	1.87	2.24	2.57	2.40	2.91	3.26	3.93
		9.50	1.28	2.02	2.41	2.77	2.60	3.13	3.51	4.23
		10.00	1.38	2.17	2.59	2.97	2.80	3.36	3.76	4.53
	100	6.50	.68	1.10	1.33	1.52	1.30	1.72	1.93	2.32
		7.00	.78	1.25	1.50	1.72	1.50	1.94	2.18	2.62
		7.50	.88	1.40	1.68	1.92	1.70	2.17	2.43	2.92
		8.00	.98	1.55	1.85	2.12	1.90	2.39	2.68	3.22
		8.50	1.08	1.70	2.03	2.32	2.10	2.62	2.93	3.52
		9.00	1.18	1.85	2.20	2.52	2.30	2.84	3.18	3.82
		9.50	1.28	2.00	2.38	2.72	2.50	3.07	3.43	4.12
		10.00	1.38	2.15	2.55	2.92	2.70	3.29	3.68	4.42
	110	6.50	.68	1.05	1.29	1.47	1.20	1.65	1.85	2.21
		7.00	.78	1.20	1.47	1.67	1.40	1.88	2.10	2.51
		7.50	.88	1.35	1.64	1.87	1.60	2.10	2.35	2.81
		8.00	.98	1.50	1.82	2.07	1.80	2.33	2.60	3.11
		8.50	1.08	1.65	1.99	2.27	2.00	2.55	2.85	3.41
		9.00	1.18	1.80	2.17	2.47	2.20	2.78	3.10	3.71
		9.50	1.28	1.95	2.34	2.67	2.40	3.00	3.35	4.01
		10.00	1.38	2.10	2.52	2.87	2.60	3.23	3.60	4.31

Return over feed cost for milk production

		Milk, lbs. daily	20	30	35	40	40	45	50	60
		Hay, lbs. daily	31	30	30	29	15	28	26	24
		Grain, lbs. daily	0	5	7	10	20	13	16	22
Hay $/T	Grain $/T	Milk $/cwt								
45	60	6.50	.60	1.12	1.39	1.65	1.66	1.91	2.18	2.70
		7.00	.70	1.27	1.57	1.85	1.86	2.13	2.43	3.00
		7.50	.80	1.42	1.74	2.05	2.06	2.36	2.68	3.30
		8.00	.90	1.57	1.92	2.25	2.26	2.58	2.93	3.60
		8.50	1.00	1.72	2.09	2.45	2.46	2.81	3.18	3.90
		9.00	1.10	1.87	2.27	2.65	2.66	3.03	3.43	4.20
		9.50	1.20	2.02	2.44	2.85	2.86	3.26	3.68	4.50
		10.00	1.30	3.17	2.62	3.05	3.06	3.48	3.93	4.80
	70	6.50	.60	1.09	1.36	1.60	1.56	1.85	2.10	2.59
		7.00	.70	1.24	1.54	1.80	1.76	2.07	2.35	2.89
		7.50	.80	1.39	1.71	2.00	1.96	2.29	2.60	3.19
		8.00	.90	1.54	1.89	2.20	2.16	2.52	2.85	3.49
		8.50	1.00	1.69	2.06	2.40	2.36	2.75	3.10	3.79
		9.00	1.10	1.84	2.24	2.60	2.56	2.97	3.35	4.09
		9.50	1.20	1.99	2.41	2.80	2.76	3.19	3.60	4.39
		10.00	1.30	2.14	2.59	3.00	2.96	3.42	3.85	4.69
	80	6.50	.60	1.07	1.32	1.55	1.46	1.78	2.02	2.48
		7.00	.70	1.22	1.50	1.75	1.66	2.00	2.27	2.78
		7.50	.80	1.37	1.67	1.95	1.86	2.22	2.52	3.08
		8.00	.90	1.52	1.85	2.15	2.06	2.45	2.77	3.38
		8.50	1.00	1.67	2.02	2.35	2.26	2.68	3.02	3.68
		9.00	1.10	1.82	2.20	2.55	2.46	2.90	3.27	3.98
		9.50	1.20	1.97	2.37	2.75	2.66	3.12	3.52	4.28
		10.00	1.30	2.12	2.55	2.95	2.86	3.35	3.77	4.58
	90	6.50	.60	1.04	1.29	1.50	1.36	1.72	1.94	2.37
		7.00	.70	1.19	1.47	1.70	1.56	1.94	2.19	2.67
		7.50	.80	1.34	1.63	1.90	1.76	2.16	2.44	2.97
		8.00	.90	1.49	1.81	2.10	1.96	2.39	2.69	3.27
		8.50	1.00	1.64	1.99	2.30	2.16	2.62	2.94	3.57
		9.00	1.10	1.79	2.17	2.50	2.36	2.84	3.19	3.87
		9.50	1.20	1.94	2.33	2.70	2.56	3.06	3.44	4.17
		10.00	1.30	2.09	2.51	2.90	2.76	3.29	3.69	4.47
	100	6.50	.60	1.02	1.25	1.45	1.26	1.65	1.86	2.26
		7.00	.70	1.17	1.43	1.65	1.46	1.87	2.11	2.56
		7.50	.80	1.32	1.59	1.85	1.66	2.09	2.36	2.86
		8.00	.90	1.47	1.77	2.05	1.86	2.32	2.61	3.16
		8.50	1.00	1.62	1.95	2.25	2.06	2.55	2.86	3.46
		9.00	1.10	1.77	2.13	2.45	2.26	2.77	3.11	3.76
		9.50	1.20	1.92	2.29	2.65	2.46	2.99	3.36	4.06
		10.00	1.30	2.07	2.47	2.85	2.66	3.22	3.61	4.36
	110	6.50	.60	.99	1.21	1.40	1.16	1.59	1.78	2.15
		7.00	.70	1.14	1.39	1.60	1.36	1.81	2.03	2.45
		7.50	.80	1.29	1.55	1.80	1.56	2.03	2.28	2.75
		8.00	.90	1.44	1.73	2.00	1.76	2.26	2.53	3.05
		8.50	1.00	1.59	1.91	2.20	1.96	2.49	2.78	3.35
		9.00	1.10	1.74	2.09	2.40	2.16	2.71	3.03	3.65
		9.50	1.20	1.89	2.25	2.60	2.36	2.93	3.28	3.95
		10.00	1.30	2.04	2.43	2.80	2.56	3.16	3.53	4.25

Return over feed cost for milk production

		Milk, lbs. daily	20	30	35	40	40	45	50	60
		Hay, lbs. daily	31	30	30	29	15	28	26	24
		Grain, lbs. daily	0	5	7	10	20	13	16	22
Hay $/T	Grain $/T	Milk $/cwt								
50	60	6.50	.52	1.05	1.32	1.57	1.62	1.84	2.12	2.64
		7,00	.62	1.20	1.49	1.77	1.82	2.06	2.37	2.94
		7.50	.72	1.35	1.67	1.97	2.02	2.29	2.62	3.24
		8.00	.82	1.50	1.84	2.17	2.22	2.51	2.87	3.54
		8.50	.92	1.65	2.02	2.37	2.42	2.74	3.12	3.84
		9.00	1.02	1.80	2.19	2.57	2.62	2.96	3.37	4.14
		9.50	1.12	1.95	2.37	2.77	2.82	3.19	3.62	4.44
		10.00	1.22	2.10	2.54	2.97	3.02	3.41	3.87	4.74
	70	6.50	.52	1.02	1.29	1.52	1.52	1.78	2.04	2.53
		7.00	.62	1.17	1.46	1.72	1.72	2.00	2.29	2.83
		7.50	.72	1.32	1.64	1.92	1.92	2.23	2.54	3.13
		8.00	.82	1.47	1.81	2.12	2.12	2.45	2.79	3.43
		8.50	.92	1.62	1.99	2.32	2.32	2.68	3.04	3.73
		9.00	1.02	1.77	2.16	2.52	2.52	2.90	3.29	4.03
		9.50	1.12	1.92	2.34	2.72	2.72	3.13	3.54	4.33
		10.00	1.22	2.07	2.51	2.92	2.92	3.35	3.79	4.63
	80	6.50	.52	1.00	1.25	1.47	1.42	1.71	1.96	2.42
		7.00	.62	1.15	1.42	1.67	1.62	1.93	2.21	2.72
		7.50	.72	1.30	1.60	1.87	1.82	2.16	2.46	3.02
		8.00	.82	1.45	1.77	2.07	2.02	2.39	2.71	3.32
		8.50	.92	1.60	1.95	2.27	2.22	2.61	2.96	3.62
		9.00	1.02	1.75	2.12	2.47	2.42	2.83	3.21	3.92
		9.50	1.12	1.90	2.30	2.67	2.62	3.06	3.46	4.22
		10.00	1.22	2.05	2.47	2.87	2.82	3.29	3.71	4.52
	90	6.50	.52	.97	1.22	1.42	1.32	1.65	1.88	2.31
		7.00	.62	1.12	1.39	1.62	1.52	1.87	2.13	2.61
		7.50	.72	1.27	1.57	1.82	1.72	2.10	2.38	2.91
		8.00	.82	1.42	1.74	2.02	1.92	2.33	2.63	3.21
		8.50	.92	1.57	1.92	2.22	2.12	2.55	2.88	3.51
		9.00	1.02	1.72	2.09	2.42	2.32	2.77	3.13	3.81
		9.50	1.12	1.87	2.27	2.62	2.52	3.00	3.38	4.11
		10.00	1.22	2.02	2.44	2.82	2.72	3.23	3.63	4.41
	100	6.50	.52	.95	1.18	1.37	1.22	1.58	1.80	2.20
		7.00	.62	1.10	1.35	1.57	1.42	1.80	2.05	2.50
		7.50	.72	1.25	1.53	1.77	1.62	2.03	2.30	2.80
		8.00	.82	1.40	1.70	1.97	1.82	2.26	2.55	3.10
		8.50	.92	1.55	1.88	2.17	2.02	2.48	2.80	3.40
		9.00	1.02	1.70	2.05	2.37	2.22	2.70	3.05	3.70
		9.50	1.12	1.85	2.23	2.57	2.42	2.93	3.30	4.00
		10.00	1.22	2.00	2.40	2.77	2.62	3.16	3.55	4.30
	110	6.50	.52	.92	1.15	1.32	1.12	1.52	1.72	2.09
		7.00	.62	1.07	1.32	1.52	1.32	1.74	1.97	2.39
		7.50	.72	1.22	1.50	1.72	1.52	1.97	2.22	2.69
		8.00	.82	1.37	1.67	1.92	1.72	2.20	2.47	2.99
		8.50	.92	1.52	1.85	2.12	1.92	2.42	2.72	3.29
		9.00	1.02	1.67	2.02	2.32	2.12	2.64	2.97	3.59
		9.50	1.12	1.82	2.20	2.52	2.32	2.87	3.22	3.89
		10.00	1.22	1.97	2.37	2.72	2.52	3.10	3.47	4.19

Return over feed cost for milk production

		Milk, lbs. daily Hay, lbs. daily Grain, lbs. daily	20 31 0	30 30 5	35 30 7	40 29 10	40 15 20	45 28 13	50 26 16	60 24 22
Hay $/T	Grain $/T	Milk $/cwt								
55	60	6.50	.45	.97	1.25	1.50	1.59	1.77	2.05	2.58
		7.00	.55	1.12	1.42	1.70	1.79	1.99	2.30	2.88
		7.50	.65	1.27	1.59	1.90	1.99	2.22	2.55	3.18
		8.00	.75	1.42	1.77	2.10	2.19	2.44	2.80	3.48
		8.50	.85	1.57	1.94	2.30	2.39	2.73	3.05	3.78
		9.00	.95	1.72	2.11	2.50	2.59	2.95	3.30	4.08
		9.50	1.05	1.87	2.19	2.70	2.79	3.18	3.55	4.38
		10.00	1.15	2.02	2.36	2.90	2.99	3.40	3.80	4.68
	70	6.50	.45	.94	1.21	1.45	1.49	1.71	1.97	2.47
		7.00	.55	1.09	1.38	1.65	1.69	1.93	2.22	2.77
		7.50	.65	1.24	1.55	1.85	1.89	2.16	2.47	3.07
		8.00	.75	1.39	1.73	2.05	2.09	2.38	2.72	3.37
		8.50	.85	1.54	1.90	2.25	2.29	2.67	2.97	3.67
		9.00	.95	1.69	2.07	2.45	2.42	2.89	3.22	3.97
		9.50	1.05	1.84	2.25	2.65	2.62	3.12	3.47	4.29
		10.00	1.15	1.99	2.42	2.85	2.82	3.34	3.72	4.57
	80	6.50	.45	.92	1.18	1.40	1.39	1.64	1.89	2.36
		7.00	.55	1.07	1.35	1.60	1.59	1.86	2.14	2.66
		7.50	.65	1.22	1.52	1.80	1.79	2.09	2.39	2.96
		8.00	.75	1.37	1.70	2.00	1.99	2.31	2.64	3.26
		8.50	.85	1.52	1.87	2.20	2.19	2.60	2.89	3.56
		9.00	.95	1.67	2.04	2.40	3.39	2.82	3.14	3.86
		9.50	1.05	1.82	2.22	2.60	2.59	3.05	3.39	4.16
		10.00	1.15	1.97	2.39	2.80	2.79	3.27	3.64	4.46
	90	6.50	.45	.89	1.14	1.35	1.29	1.58	1.81	2.25
		7.00	.55	1.04	1.31	1.55	1.49	1.80	2.06	2.55
		7.50	.65	1.19	1.48	1.75	1.69	2.03	2.31	2.85
		8.00	.75	1.34	1.66	1.95	1.89	2.25	2.56	3.15
		8.50	.85	1.49	1.83	2.15	2.09	2.54	2.81	3.45
		9.00	.95	1.64	2.00	2.35	2.29	2.76	3.06	3.75
		9.50	1.05	1.79	2.18	2.55	2.49	2.99	3.31	4.05
		10.00	1.15	1.94	2.35	2.75	2.69	3.21	3.56	4.35
	100	6.50	.45	.87	1.11	1.30	1.19	1.51	1.73	2.14
		7.00	.55	1.02	1.28	1.50	1.39	1.73	1.98	2.44
		7.50	.65	1.17	1.45	1.70	1.59	1.96	2.23	2.74
		8.00	.75	1.32	1.63	1.90	1.79	2.18	2.48	3.04
		8.50	.85	1.47	1.80	2.10	1.99	2.47	2.73	3.34
		9.00	.95	1.62	1.97	2.30	2.19	2.69	2.98	3.64
		9.50	1.05	1.77	2.15	2.50	2.39	2.92	3.23	3.94
		10.00	1.15	1.92	2.32	2.70	2.59	3.14	3.48	2.24
	110	6.50	.45	.84	1.07	1.25	1.09	1.45	1.65	2.03
		7.00	.55	.99	1.24	1.45	1.29	1.67	1.90	2.33
		7.50	.65	1.14	1.41	1.65	1.49	1.90	2.15	2.63
		8.00	.75	1.29	1.59	1.85	1.69	2.12	2.40	2.93
		8.50	.85	1.44	1.76	2.05	1.89	2.41	2.65	3.23
		9.00	.95	1.59	1.93	2.25	2.09	2.63	2.90	3.53
		9.50	1.05	1.74	2.11	2.65	2.29	2.86	3.15	3.83
		10.00	1.15	1.89	2.28	2.85	2.49	3.08	3.40	4.13

Return over feed cost for milk production

		Milk, lbs. daily	20	30	35	40	40	45	50	60
		Hay, lbs. daily	31	30	30	29	15	28	26	24
		Grain, lbs. daily	0	5	7	10	20	13	16	22
Hay $/T	Grain $/T	Milk $/cwt								
60	60	6.50	.37	.90	1.17	1.43	1.55	1.70	1.99	2.52
		7.00	.47	1.05	1.34	1.63	1.75	1.92	2.24	2.82
		7.50	.57	1.20	1.52	1.83	1.95	2.15	2.49	3.12
		8.00	.67	1.35	1.69	2.03	2.15	2.37	2.74	3.42
		8.50	.77	1.50	1.87	2.23	2.35	2.60	2.99	3.72
		9.00	.87	1.65	2.04	2.43	2.55	2.82	3.24	4.02
		9.50	.97	1.80	2.22	2.63	2.75	3.05	3.49	4.32
		10.00	1.07	1.95	2.39	2.83	2.95	3.27	3.74	4.62
	70	6.50	.37	.87	1.14	1.38	1.45	1.64	1.91	2.41
		7.00	.47	1.02	1.31	1.58	1.65	1.86	2.16	2.71
		7.50	.57	1.17	1.49	1.78	1.85	2.09	2.41	3.01
		8.00	.67	1.32	1.66	1.98	2.05	2.31	2.66	3.31
		8.50	.77	1.47	1.84	2.18	2.25	2.54	2.91	3.61
		9.00	.87	1.62	2.01	2.38	2.45	2.76	3.16	3.91
		9.50	.97	1.77	2.19	2.58	2.65	2.99	3.41	4.21
		10.00	1.07	1.92	3.36	2.78	2.85	3.21	3.66	4.51
	80	6.50	.37	.85	1.10	1.33	1.35	1.57	1.83	2.30
		7.00	.47	1.00	1.27	1.53	1.55	1.79	2.08	2.60
		7.50	.57	1.15	1.45	1.73	1.75	2.02	2.33	2.90
		8.00	.67	1.30	1.62	1.93	1.95	2.24	2.58	3.20
		8.50	.77	1.45	1.80	2.13	2.15	2.47	2.83	3.50
		9.00	.87	1.60	1.97	2.33	2.35	2.69	3.08	3.80
		9.50	.97	1.75	2.15	2.53	2.55	2.92	3.33	4.10
		10.00	1.07	1.90	2.32	2.73	2.75	3.14	3.58	4.40
	90	6.50	.37	.82	1.07	1.28	1.25	1.51	1.75	2.19
		7.00	.47	.97	1.24	1.48	1.45	1.73	2.00	2.49
		7.50	.57	1.12	1.42	1.68	1.65	1.96	2.25	2.79
		8.00	.67	1.27	1.59	1.88	1.85	2.18	2.50	3.09
		8.50	.77	1.42	1.77	2.08	2.05	2.41	2.75	3.39
		9.00	.87	1.57	1.94	2.28	2.25	2.63	3.00	3.69
		9.50	.97	1.72	2.12	2.48	2.45	2.86	3.25	3.99
		10.00	1.07	1.87	2.29	2.68	2.65	3.08	3.50	4.29
	100	6.50	.37	.80	1.03	1.23	1.15	1.44	1.67	2.08
		7.00	.47	.95	1.20	1.43	1.35	1.66	1.92	2.38
		7.50	.57	1.10	1.38	1.63	1.55	1.89	2.17	2.68
		8.00	.67	1.25	1.55	1.83	1.75	2.11	2.42	2.98
		8.50	.77	1.40	1.73	2.03	1.95	2.37	2.67	3.28
		9.00	.87	1.55	1.90	2.23	2.15	2.59	2.92	3.58
		9.50	.97	1.70	2.08	2.43	2.35	2.82	3.17	3.88
		10.00	1.07	1.85	2.22	2.63	2.55	3.04	3.42	4.18
	110	6.50	.37	.77	1.00	1.18	1.05	1.38	1.59	1.97
		7.00	.47	.92	1.17	1.38	1.25	1.60	1.84	2.27
		7.50	.57	1.07	1.35	1.58	1.45	1.83	2.09	2.57
		8.00	.67	1.22	1.52	1.78	1.65	2.05	2.34	2.87
		8.50	.77	1.37	1.70	1.98	1.85	2.31	2.59	3.17
		9.00	.87	1.52	1.87	2.18	2.05	2.53	2.84	3.47
		9.50	.97	1.67	2.05	2.38	2.25	2.76	3.09	3.77
		10.00	1.07	1.82	2.22	2.58	2.45	2.98	3.34	4.07

Estimated dairy investment costs

Cows in herd	30	60	120	240	480
Parlor, stalls	15,000	18,000	21,000	25,000	25,000
Sheds, yards, mangers	5,250	10,500	21,000	42,000	84,000
Machine, tank	12,000	15,000	18,000	22,000	25,000
Outside equipment	5,000	8,000	12,000	16,000	20,000
Total	37,250	51,500	72,000	105,000	154,000
Per cow	1,242	858	600	438	321
Cows @ 650	19,500	39,000	78,000	156,000	312,000
Total	56,750	90,500	150,000	261,000	446,000
Per cow	1,892	1,508	1,250	1,088	929
20 yr. 11% principal	20,250	28,500	42,000	67,000	109,000
yearly payment	2,238	3,149	4,641	7,404	12,045
10 yr. 11% principal	17,000	23,000	30,000	38,000	45,000
yearly payment	2,729	3,692	4,815	6,099	7,222
5 yr. 11% principal	19,500	39,000	78,000	156,000	312,000
yearly payment	5,080	10,160	20,320	40,638	81,276
Total principal	56,750	90,500	150,000	261,000	446,000
yearly payment	10,047	17,001	29,776	54,141	100,543
per cow	344	283	248	226	209
monthly payment	837	1,417	2,481	4,512	8,379
monthly/cow	28	24	21	19	17

Table 8. Non-feed costs of producing milk

Cows in herd	30	60	120	240	480
Vet-med. @ $20	600	1,200	2,400	4,800	9,600
Breeding @ $15	450	900	1,800	3,600	7,200
Fees, taxes, ins. @ $20	600	1,200	2,400	4,800	9,600
Misc. @ $15	450	900	1,800	3,600	7,200
Hauling @ $24	720	1,440	2,880	5,760	11,520
Repl. @ $50	1,500	3,000	6,000	12,000	24,000
Labor @ $120	3,600	7,200	14,400	28,800	57,600
Total	7,920	15,840	31,680	63,360	126,720
Per cow	264	264	264	264	264
daily/cow	.72	.72	.72	.72	.72
Note repayment, yearly per herd	10,047	17,001	29,776	54,141	100,547
yearly per cow	344	283	248	226	209
daily per cow	.94	.78	.68	.62	.57
Total non feed costs	1.66	1.50	1.40	1.34	1.29

APPENDIX R

THE THEORY OF INDUCED SOCIAL CHANGE

The theory of Induced Social Change is a theory that social change may be brought about in a calculated, premeditated manner. The following is an exerpt from "Society and Culture", by Francis E. Merril.

> --there is no single cause of social change, nor is there a single and all-embracing theory of social change. We are here merely presenting one pattern out of several possible patterns of change. With this reservation, we may indicate the process by which technology, which is a cultural instrument, gives rise to social change. In order of their occurrence, the typical stages in this pattern are as follows.
>
> 1. Technological innovations. An innovation is "any thought, behavior, or thing that is new because it is qualitatively different from existing forms." Technology is application of pure science to the immediate, "practical" ends of human beings. Changes on this level occur every day, and their combined effects upon human behavior are literally impossible to calculate.
> 2. Economic organization. Economic organization ordinarily feels the first impact of change from advances in technology within the society or the introduction of new industrial techniques from without. Economic organization is the pattern of social relationships existing for the production, distribution, and consumption of goods and services. In no other nation has technology innovation been applied so directly and efficiently as in the United States.
> 3. Social institutions. The organized patterns of relationships constituting the family, church, school, and government are next to feel the impact of social change. The structure of the family has undergone many important changes in recent decades because of the gainful employment of married women. With one in every three married women employed outside the home, the family will never be the same again. In the future, the application of science to the cultural and biological fields will doubtless still further alter the family.
> 4. Social values. The values at the basis of the institution are the goals for which men strive, the ends they seek. Monogamy is a social value at the heart of the Christian family; freedom is the basis of our economic and political institutions. These ideological elements change very slowly.

Human reaction to social change may be passive or active. Induced social change is active.

APPENDIX S

The following feasibility study is one which was drawn up specifically for the Glen Valley Dairy Cooperative.

June 11, 1974.

Re: Feed Costs - Glen Valley Co-op

NOTE: That the attached financial proposal is based on alfalfa hay at $50.00 per ton because the producer participants involved requested that price be used. The general feasibility report on Dairy Co-ops and other specific applications completed are based on $60.00 per ton resulting in an additional annual expense of $73,000 per year which reduces the average cash flow after year 5 to $25,000 per year rather than $96,000.

Although slight variations in alfalfa hay price occur between locations, there is no apparent justification at this time for different feed prices to be used for different proposals, and, therefore, the applications should be considered on the same basis.

Marvin M. Galts

Regional Economist

SUMMARY OF GLEN VALLEY DAIRY CO-OP FEASIBILITY REPORT

The feasibility report was done for a group of producers who wish to start a 1,250 head co-op dairy in the Glenwood area as an Alberta Government sponsored pilot project.

This report was completed based on the following:

1. Assumptions as given on Pages 2, 3, and 4.
2. Information provided by Alberta Department of Agriculture Dairy Consensus Research Data Reports and other government reports.
3. Information provided by producers.
4. Information gathered from investigations of similar type dairies in southern Utah and central Arizona.
5. Current price trends.

The total investment required by the co-op for land, buildings, equipment, cattle and operating capital is $2,303,000^{(1)}. This money will be required over the first two years. Of this total amount, $200,000 will be provided as equity by investors and investors will be personally liable for another $200,000 on a government guaranteed certificate. The co-op requires loans amounting to $2,103,000 over twenty years and they hope to acquire these loans at 9 per cent interest. It is further requested that the government will provide a deferral of principal and interest payments for the first three years.

The herd is to be established by buying 1,375 open heifers at breeding weight in year one and raising them to first lactation at which time the necessary facilities will be completed. This approach is taken to hopefully limit disease problems which may incur by bringing together mature herds of dairy cows and was the method advised by dairymen in the United States.

When establishing the dairy, it is hoped that the provincial government will provide professional experienced consultants to assist with the initial phases of the operation.

In year four, the feasibility study shows the co-op should be able to make full interest and principal payment and begin paying dividends to investors.

(1) See Assumption 4 of Feasibility Report

SUMMARY OF ASSUMPTIONS

1. Dairy Co-op is to be financed with $200,000 in equity provided by twenty-five Co-op members, which represents 9% of total investment. An additional $200,000 will be borrowed from the provincial government for which each investor will be directly responsible for repayment of a portion. The loan of $2,103,000 is to be financed at 9% over twenty years with a deferral of interest payments for the first three years and a deferral of principal payments or portions of principal payments for three years.

2. Milk price calculated at $8.35 per cwt. after dairy commission deduction and before transportation charges.

3. Feed Prices: Hay costs calculated at $50.00 per ton
Barley price calculated at $110.00 per ton for prepared grain ration

Total Feed Consumption Per Year: 7,527 tons of alfalfa hay
2,980 tons of prepared grain ration plus milk, concentrates, etc.

4. Long term loan and investors' equity required by dairy Co-op in first two years:

$653,125	for open heifers and incurred expenses
354,799	for first year operating capital required to raise heifers to first lactation
100,000	for land and developments
55,286	contingent expenses
843,890	for free stall housing
50,000	for dry cow and replacement accommodations
105,000	for facilities, feed and handling equipment
140,000	for polygon type milking parlor and all hardware
$2,303,000	Total

5. Labor Requirements:

Manager	$16,000 to $20,000
Assistant Manager (and Herdsman)	$10,000
Assistant to Herdsman	$8,000
Bookkeeper and Office Administration	$8,000
6 Milkers	$7,100 per man
4 Laborers for corral cleaning, feeding and relative duties	$7,100 per man
2 Watchmen	$7,100 per man

Cost of Labor Calculated at $131,200 per year

6. Replacements:

H Heifer calf costs assume 10% death loss in first year and an additional 2% death loss in following year. It was further assumed that 242 heifer calves would be sold each year shortly after birth and that 320 would be raised for replacements. Feed and direct production costs per head per replacement calculated as follows over two year period:

- It was calculated that in year three some replacements would have to be bought from outside sources.

Feed

600 lbs. milk at $6.70/cwt.	$26.80	first year
30 lbs. of calf starter	$1.27	
1,340 lbs. of prepared grain ration	$73.70	
4,080 lbs. of alfalfa hay	$101.25	
1,440 lbs. of prepared grain ration	$79.20	second year
6,300 lbs. of alfalfa hay	$157.50	
Total Feed Costs Per Head	$439.72	

Other Direct Production Costs:

Bedding	$15.00
A.I.	$12.00
Veterinary and Medicine	$10.00
Taxes and Utilities	$0.25
Miscellaneous	$2.00
TOTAL	$39.25/two years

Other costs such as equipment operating included on mature cow/head costs.

7. Dairy Cow Costs:

-Dairy herd costs were calculated on a 10% cull and death ratio in year two and a 25% cull ratio, including 3% death loss from then on. It was assumed that herd would be started by buying 1,375 open heifers at approximate weight of 750 lbs. which would be bred and raised to freshening.

-Feed and direct production costs per head calculated as follows over one year period:

Feed:

4.6 tons alfalfa	$230.00
2 tons prepared grain ration	$220.00
Total Feed Cost Per Year	$450.00

Other Direct Production Costs:

Supplies	$12.50
Breeding	$11.00
Veterinary and Medicine	$15.00
D.H.I.A.	$1.50
Taxes and Insurance	$1.50
Utilities	$20.00
Bedding and Miscellaneous	$6.00
Machinery and Equipment Operating	$6.00
TOTAL	$73.50

Milk transportation costs were calculated at $0.15 per cwt.

8. Cow Numbers and Production:

It was assumed that during first year there would be no production. After year one, there would be a 1,250 head cow herd at all times. Production during year two was assumed to be 10,000 lbs. of milk per head, year three production was assumed to be 10,500 lbs. per cow, year four assumed production level of 11,500 lbs. per cow and from year five on it was assumed that herd production would be 12,000 lbs. per cow.

9. Bull Calves:

It was assumed that all bull calves would be sold shortly after birth for an average price of $75.00 per head.

10. Operating Capital:

Average yearly operating capital requirements calculated at $1,048,220 to be borrowed on term notes at 9 and one half per cent per year and retired in same year.

11. Interest Calculations:

Interest on feed calculated at 11 per cent for one quarter year. Interest on other operating capital calculated at 11 per cent for one half year.

CONSTRUCTION COSTS

250 HEAD LOAFING BARN: 84' x 290'	Least Cost Material	High Cost Material	Labor Cost
Material (Lumber, Nails, etc.)	$45,066	$69,426	
Foundation	4,488	4,488	
Floor (Concrete)	10,962	10,962	
Insulation (1 in. styrofoam for roof)	7,500	7,500	
Ventilation	2,707	2,707	
Free Stalls	5,320	5,320	
Labor (Loafing Barn Construction)	32,000	32,000	$32,000
Excavation	5,413	5,413	
Trenching	935	935	
Manure Storage	5.000	5,000	
Feed Bunks	1,960	1,960	980
Feed Conveyor	8,400	8,400	4,200
TOTAL LOAFING BARN CONSTRUCTION COSTS	$129,751	$154,111	$37,180
TOTAL PER HEAD		$617.64	
COST FOR 1,000 HEAD		$614,640	
Allowance for additional feeding equipment, handling equipment, manure handling equipment, covered and paved alleys and contingent expenses		$226,250	
Total		$843,890	
Dry cow and calf accommodation		$50,000	

Land and Developments:

320 acres @ $200/acre	$64,000
20,000 bushel grain storage	10,000
Developments	26,000
Total	$100,000

CONSTRUCTION COSTS

MILKHOUSE: 44' x 136'	Least Cost Material	High Cost Material	Labor Cost
Material (Lumber, Nails, etc.)	$11,070	$17,054	
Foundation	2,160	2,160	
Floor (Concrete)	2,693	2,693	
Insulation	2,898	2,898	
Lineal Panel	1,512	1,512	
Ventilation	662	665	
Plumbing: (a) Hot Water Tank	490	971	
(b) Cold Water Tank	160	160	
(c) Pump - 1 H.P.	265	623	
(d) Water Pipes	50	75	
(e) Well (complete)	700	1,000	
(f) Sewage System (tank and drain pipes)	1,500	2,000	
(g) Labor (for plumbing)	1,800	3,600	$3,600
Labor (for milkhouse construction)	3,890	5,984	5,984
Excavation	1,329	1,329	
Trenching	450	450	
TOTAL MILKHOUSE CONSTRUCTION	$31,632	$43,174	$9,584

24 POINT POLYGON MILK PARLOUR - ESTIMATED COSTS

24 fully automated points @ $1,800 each	$43,200
Vacuum pump	3,000
Vacuum line	520
Vacuum line control guage	300
Milk pipeline with elbows, supports and pipe hangers	10,000
In line filters	336
Receiver tank and milk pump assembly	4,125
Plate heat exchanger	1,200
Sweet water unit with 2,000 lb. ice capacity complete with compressor and circulating pump	3,875
Milk storage tank - 6,000 gal. capacity	25,000
5 H.P. compressor	1,200
Air compressor for crowd control gates	1,500
Fully automated washer	800
Wash tank	320
Subtotal	$95,376
Estimated milkhouse and parlour construction cost (136' x 44')	44,500
Total	$139,876

BASIC FEED AND HANDLING EQUIPMENT REQUIRED

30 - 40 ton scale installed	$11,000 - $12,000
Industrial front end loader (used)	19,000
2 feed wagons with scales ($10,750 list)	21,500
2 tractors 65 H.P. with unloader ($9,250)	18,500
Bob cat	7,000
Liquid manure wagon	3,000
Liquivator	2,700
Standby generator	1,300
Bale wagon	8,400
Roller mill 36"	2,500
	$95,900
Other miscellaneous equipment allowance	10,000
	$105,900

PRO FORMA FOR 1,250 HEAD DAIRY WITH DEFERRAL OF PRINCIPAL AND INTEREST PAYMENT FOR FIRST THREE YEARS

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Cash Receipts:						
Sale of Milk(3)	--	$1,043,750	$1,095,938	$1,185,938	$1,237,500	$1,237,500
Sale of Livestock	--	150,525	171,040	171,040	171,040	171,040
TOTAL		$1,194,275	$1,266,978	$1,356,978	$1,408,540	$1,408,540
Estimated Expenses:						
Feed(4)	$325,500	$713,600	$713,600	$713,600	$713,600	$713,600
Labor	48,400	131,200	131,200	131,200	131,200	131,200
Direct Production Costs	54,000	105,500	105,500	105,500	105,500	105,500
Interest on Operating Capital	--	32,650	32,650	32,650	32,650	32,650
Replacements	653,125	--	81,250	--	--	--
Milk Transportation	--	18,750	19,700	21,565	22,500	22,500
Investment in Buildings, and Facilities, Land and Equipment	190,000	1,224,900	109,800	--	--	--
Debt Retirement	--	--	--	306,100	306,100	306,100
TOTAL	$1,271,025	$2,226,600	$1,193,700	$1,310,615	$1,311,550	$1,311,550
Cash Balance	- $1,271,025	- $1,032,325	- $78,278	$46,363	$96,990	$96,990
	(Cash balance would be reduced by $73,000 if hay cost is $60.00 per ton)					
Monies Required For Investment	$1,271,025	$1,032,325	--	--	--	--
Yearly Interest Due	$96,400	$198,000	$215,800			
Total Debt to be Retired(5)	(5) $2,613,550					

Production Lavel Assumed:
10,000 lbs./head in yr. 2
10,500 lbs./head in yr. 3
11,500 lbs./head in yr. 4
12,000 lbs./head in yr. 5 and 6

(1) Portion of average principal payment
(2) Full retirement payment of amortized debt
(3) $8.50/cwt. less 15¢ holdback
(4) Based on $50/ton alfalfa
(5) Includes $510,000 capital investment

APPENDIX T

The following are reports submitted by representatives from Glenwood who participated in the Utah-Arizona Dairy Tour in March, 1974.

UNITED IRRIGATION DISTRICT CHEESE FACTORY

Co-operative Association Limited

Glenwoodville, Alta.
March 19, 1974

Mr. Dennis J. Prince,
Regional Dairy Specialist,
EDMONTON, Alberta

Dear Sir:

Following is my report of the Dairy Tour. I made this trip to see first hand the operation and management of large dairies in the United States.

The knowledge I gained, I will use to promote a Dairy Co-op in the Glenwood area.

The lengh of time spent was sufficient to get a good overview of large dairy operations.

I was very much impressed by the Cache Valley Cheese Factory, specifically the size and production they have attained. We Canadians have a tendency to think small; we are too conservative.

I was impressed by the Utah State Dairy Team at Logan. They have had a good deal of experience in dairy co-ops and were very willing to share their wide knowledge with our dairy investigation team.

I feel the best example of a dairy co-op relative to us was the Gunnison Co-op. I believe they have the best management and design.

I believe dairy co-ops are one answer to dairy situations in Alberta, namely the unwillingness of young men to take over their father's dairies and have to work seven days a week, 365 days a year.

I think we should "as a result of our climate" seriously consider controlled environment housing. We underestimate the potential of dairy cows. Setting a goal of 15,000 pounds per animal per year is not out of reason. Good management and good breeding can make this possible.

Thanking you again for making this tour possible.

Sincerely yours,

UNITED IRRIGATION DISTRICT CHEESE FACTORY

Co-operative Association Limited

Glenwoodville, Alta.
March 19, 1974

Report of Utah - Arizona Dairy Tour
Date - March 3 - 9, 1974
Name - Ned E. Davidson,
Address - Glenwoodville, Alberta
Occupation - Cheese Maker

Dear Sir:

The reason for my attending the Dairy Tour was via invitation. The length of the trip was sufficient and extensive enough to get a good observation and impression of a variety of milk production operations applicable to different types of environment.

The Cache Valley Cheese operation was very impressive from the size and extent of area milk was processed from and the products manufactured and the area of distribution.

The Utah State University Dairy Team at Logan were extremely co-operative and appeared to be specialists in their various fields of work.

The farms and dairies visited were varied and I was impressed with the management and efficient way they were operated with concern for production per cow, types of feed used and housing.

I feel there are opportunities in Alberta but possibly some adaptations to environment and climatic conditions would need consideration.

Again, may I convey appreciation for the invitation to go on this tour.

Sincerely,

Ned E. Davidson,
Managing Director
UID Cheese Factory
Glenwoodville, Alta.

NED/fda.

REPORT OF UTAH-ARIZONA DAIRY TOUR

Date: March 3 - 9, 1974
Name: Larry Lybbert
Address: Glenwood, Alberta
Occupation: Dairy Farmer

In the fall of 1973, there was a meeting held at Glenwood to discuss the possibility of organizing a Dairy Co-op in the area. Since that time, I have had a desire to visit the large co-op dairies in Southern Utah. A committee was organized to look into the feasibility of a 1000 cow co-op. The committee felt that a tour of other dairies would be very educational and helpful in selling the idea of co-op to other people. A proposal for subsidization from the government for the tour was presented to and accepted by government officials. It was suggested by Dr. Purnell that the tour include more than just Southern Utah. He suggested that Arizona and parts of California be also included. The group felt that visiting Arizona would make the trip plenty long.

With the help of Dennis Prince a tour of Southern Utah and Arizona was organized. The tour originally included only the Glenwood group and some government specialists; but it was changed to include people from Vauxhall, Sedgwick, St. Paul and La Crete. By having the larger group, it was more difficult to have informal discussions nonetheless, there were many ideas and opinions interchanged.

I am very interested in the dairy industry, and am quite concerned about the present situation of dairying in Alberta. I feel that the experiences of dairymen on other parts of the continent can be very helpful in our local operations.

One dairyman was asked what a manager's job should entail. He replied with four statements:

1. The manager must be able to manage the labor.
2. He must have purchasing power.
3. He should head investigation of new enterprizes (carry out feasibility studies).
4. He must be a good herdsman.

A number of the managers mentioned that they had not been left to manage without interference. It is emphasized that the manager is only responsible to the board of directors, with the president being the spokesman.

Conclusions

1. Throughout the tour everyone stressed the importance of management as the No. 1 step to success.
2. All the milking parlors throughout Utah and Arizona were extremely clean. This is something that dairy farmers in Alberta should take note of.
3. Dairy farmers in Utah and Arizona run their dairies as a business whereas the dairy farmers in Alberta run them as a pastime. The Utah and Arizona dairy farmers have a difficult time in obtaining loans to finance large dairies. In Alberta, capital is available, but farmers don't take advantage of it properly.
4. Every group emphasized the importance of buying heifers rather than mature lactating cows.
5. The use of weighing jars is a much more effective way of testing

cows than the milkoscope or milkometer.
6. There is an open market on milk in areas we visited, with no subsidies being necessary.

New Ideas Applicable to Alberta

1. Establish a dairy team to co-ordinate activities throughout the province.
2. Establish an open market with no subsidies
3. Dairy team at U.S.U. volunteered their services for presenting seminars. Alberta dairy farmers should take advantage of this opportunity.
4. Advertise and promote agriculture as a respectable industry. Also promote agriculture as the major industry of Alberta.

MILK
Alberta's No. 1
Resource

AGRICULTURE
Alberta's No. 1
Industry

APPENDIX U

The following are the By-Laws of the Glen Valley Dairy Co-operative as drawn up in October of 1973 in cooperation with the Cooperative Activities Specialist.

SUPPLEMENTAL BY-LAWS

GLEN VALLEY DAIRY CO-OP LTD.

1. OBJECTS

Subject to the objects set out in the Memorandum of Association, the objects of the co-op are:

(a) To improve the quality of dairy cows in general as to milk production, conversion rate and stature.

(b) To buy land and build accommodation for the cows which will be acceptable by all departments in government and will be suitable for the general well being of the animals involved.

(c) To generally promote the economic and cultural welfare of the members of the co-op.

(d) To associate with other organizations, co-operatives, or individuals with similar objects for the purpose of mutual aid.

2. NATURE OF BUSINESS

The acquiring and milking of cows for the industrial and/or fluid milk market.

3. CAPITAL

(a) The capital of the co-op shall consist of common shares of an unlimited number.

(b) Shares will be valued at two thousand dollars ($2,000.00) or at such other amount as may be determined from time to time by the by-laws of the co-op.

(c) Shares in the co-op must be paid for in full at time of purchase.

(d) Priorities for the disposal of shareholder shares shall be as follows:
- (i) Member of immediate family
- (ii) The co-op
- (iii) Other members in the co-op

4. MEMBERSHIP

Qualification. The holding of a share in the co-op.

(a) Membership shall be open to farmers and persons interested in dairy farming, resident in southern Alberta and more particularly within the boundaries which may be set from time to time by the board of directors.

(b) Application for membership shall be made in writing on a form provided for the purpose.

(c) Notwithstanding the open membership provisions above, application for membership and shareholding may be rejected by the directors, where, in their opinion, such rejection is in the best interest of the co-op.

(d) Expulsion from membership. The board of directors shall have the right to dismiss any member and repurchase his share of stock for actions, in their opinion, harmful to the co-op. The member so dismissed may appeal to the next general meeting or annual meeting of the membership, and its majority opinion shall be final.

(e) Withdrawal. A member wishing to terminate his membership shall make written application to the board of directors who may repurchase his share at par value on their paid up value or, in the event of a share capital of the association being impaired at such a price as to the board of directors may appear to be fair and reasonable. In the purchase of the member's shares the directors shall not impair the solvency of the association.

5. DIRECTORS

(a) The qualification of a director shall be the holding of a share in the co-op.

(b) The majority elected to the board of directors shall be bonafide farmers.

(c) The directors shall be elected at a duly called Annual General Meeting of the members. The directors shall have power from time to time, and at any time to appoint any member to be a director to fill a casual vacancy on the board of directors, but any director so appointed shall hold office up and until the time for holding office has expired for the director whom he replaced.

(d) The directors shall appoint a chairman and a vice-chairman from among their numbers.

(e) The directors shall appoint a secretary-treasurer who may be, but need not be, a director or shareholder.

(f) The chairman shall preside at all meeting of the board of directors, and shall call to order all meetings of members. He shall sign and execute all deeds and documents in the name of the co-op when authorized to do so by the board of directors, and perform all duties incidental to his office. In the absence of the chairman or in the case of his inability to act, his powers and duties shall devolve to the vice-chairman, or upon a director specially named by the board of directors for that purpose.

(g) The continuing directors may act notwithstanding any vacancy in their body.

(h) The directors may by resolution appoint such managers or such other officers as they may deem necessary for the conduct of the affairs and business of the co-op, defining their duties and fixing their remuneration.

(i) The directors may vote a sum for the expenses and renumeration to any of their number of any other person delegated on special business of the co-op.

(j) The directors shall allot a share and shall issue a share certificate to each member who has complied with the regulations of the co-op.

(k) No shares shall be issued until fully paid up.

(l) A director may be removed from office at any time by a resolution to that effect passed by a majority of members at a duly called Extraordinary General Meeting.

(m) The quorum of any meeting of directors shall be a majority of the directors.

6. DUTIES OF TREASURER AND SECRETARY

(a) The treasurer shall have the care and custody of all the funds and securities of the co-op and deposit the same in the name of the co-op in such bank or banks as the directors may direct. He shall sign all cheques, drafts, notes and order for payment of money and he shall pay out and dispose of the same under the direction of the board of directors. He shall at all reasonable times exhibit his books and accounts to any director of the co-op upon application, at the co-op's office in business hours. He shall give such bond for the faithful performance of his duties as the directors may determine.

(b) The duties of the secretary shall be to have charge of the Minute Books of the co-op, and of all other books of the co-op and to perform such other duties as the terms of his engagement shall call for or the board of directors shall require of him.

7. MEETINGS

(a) The Annual General Meeting of the co-op shall be held at such time and place as the directors may determine, but not later than 60 days after the end of the fiscal year.

(b) The general meetings referred to in the last preceding paragraph, or clause, shall be called ordinary meetings; all other meetings of the co-op shall be called extraordinary meetings.

(c) The quorum for any meeting of members for the transaction of any business which may properly come before it shall be not less than one-tenth of the number of members in good standing. No business shall be transacted at any meeting unless the requisite quorum be present at the commencement of the business.

8. RESERVES

The directors shall create such reserve funds for the depreciation and improvements as good business practices shall dictate.

9. HERD MANAGEMENT

(a) Breeding.
  (i) All female stock will be bred to dairy type sires.
  (ii) Herd will be placed on the Provincial Dairy Herd Improvement program (D.H.I.)
  (iii) All heifers will be Bangs vaccinated at the recommended age.

(b) Feed.
  (i) The co-op shall purchase feed on the open market and is not obligated to purchase from shareholders.

  (ii) Hay and grain will be analyzed to determine nutritive content to determine supplement requirements.

APPENDIX V

The following is a record of the shares and investor liability contracted for by members of the Glen Valley Dairy Cooperative as of June 11, 1974.

Total of farmer share holders is - 44

Total of farmer shares and liability is - $172,000

Total of non-farmer shareholders is - 25

Total of non-farmer shares and liability is - $168,000

The following assumptions are made on the basis of interviews and consultations with the people involved in the Glen Valley Dairy:

1. That a total of the equivalent of 97 cows will be transferred from small farmer operations to the Co-operative, with the individual farmer specializing either in feed production or labor employment with the dairy.

2. That a total of 4,720 acres of land will be utilized by farmers specializing in feed production.

FARM	Investor Accepted Liability	Investment in Business	Equity	Percent Total Shares
A	$4,000	$2,000	0.1%	1.0
B	$4,000	$2,000	0.1%	1.0
C	$4,000	$2,000	0.1%	1.0
D	$8,000	$4,000	0.2%	2.0
E	$4,000	$2,000	0.1%	1.0
F	$4,000	$2,000	0.1%	1.0
G	$4,000	$2,000	0.1%	1.0
H	$4,000	$2,000	0.1%	1.0
I	$4,000	$2,000	0.1%	1.0
J	$40,000	$20,000	1.0%	10.0
K	$8,000	$4,000	0.2%	2.0
L	$4,000	$2,000	0.1%	1.0
M	$4,000	$2,000	0.1%	1.0
N	$4,000	$2,000	0.1%	1.0
O	$4,000	$2,000	0.1%	1.0
P	$20,000	$10,000	0.5%	5.0
Q	$4,000	$2,000	0.1%	1.0
R	$4,000	$2,000	0.1%	1.0
S	$4,000	$2,000	0.1%	1.0
T	$4,000	$2,000	0.1%	1.0
U	$16,000	$8,000	0.4%	4.0
V	$4,000	$2,000	0.1%	1.0
W	$4,000	$2,000	0.1%	1.0
X	$4,000	$2,000	0.1%	1.0
Y	$4,000	$2,000	0.1%	1.0
Z	$4,000	$2,000	0.1%	1.0
AA	$4,000	$2,000	0.1%	1.0
BB	$4,000	$2,000	0.1%	1.0
CC	$4,000	$2,000	0.1%	1.0
DD	$4,000	$2,000	0.1%	1.0
EE	$4,000	$2,000	0.1%	1.0
FF	$4,000	$2,000	0.1%	1.0
GG	$4,000	$2,000	0.1%	1.0
HH	$4,000	$2,000	0.1%	1.0
II	$4,000	$2,000	0.1%	1.0
JJ	$4,000	$2,000	0.1%	1.0
KK	$4,000	$2,000	0.1%	1.0
LL	$4,000	$2,000	0.1%	1.0
MM	$4,000	$2,000	0.1%	1.0
NN	$4,000	$2,000	0.1%	1.0
OO	$8,000	$4,000	0.2%	2.0
PP	$8,000	$4,000	0.2%	2.0
QQ	$4,000	$2,000	0.1%	1.0
RR	$4,000	$2,000	0.1%	1.0

NON-FARM	Investor Accepted Liability	Investment in Business	Equity	Percent Total Shares
A	$4,000	$2,000	0.1%	1.0
B	$4,000	$2,000	0.1%	1.0
C	$4,000	$2,000	0.1%	1.0
D	$8,000	$4,000	0.2%	2.0
E	$4,000	$2,000	0.1%	1.0
F	$4,000	$2,000	0.1%	1.0
G	$4,000	$2,000	0.1%	1.0
H	$4,000	$2,000	0.1%	1.0
I	$4,000	$2,000	0.1%	1.0
J	$8,000	$4,000	0.2%	2.0
K	$4,000	$2,000	0.1%	1.0
L	$12,000	$6,000	0.3%	3.0
M	$4,000	$2,000	0.1%	1.0
N	$12,000	$8,000	0.3%	3.0
O	$4,000	$2,000	0.1%	1.0
P	$16,000	$8,000	0.4%	4.0
Q	$16,000	$8,000	0.4%	4.0
R	$4,000	$2,000	0.1%	1.0
S	$8,000	$4,000	0.2%	2.0
T	$4,000	$2,000	0.1%	1.0
U	$4,000	$2,000	0.1%	1.0
V	$16,000	$8,000	0.2%	2.0
W	$4,000	$2,000	0.1%	1.0
X	$8,000	$4,000	0.2%	2.0
Y	$4,000	$2,000	0.1%	1.0

APPENDIX W

The following is the proposal of the Glen Valley Dairy Cooperative to the Agricultural Development Corporation for financing.

PROVINCE OF ALBERTA

MEMORANDUM

Our File No.

FROM:

Your File No.

TO:

DATE: June 11, 1974

As requested by Dr. Purnell, the application for the Glen Valley Dairy Co-op is being forwarded directly to you. Please give it your consideration and forward to the Agricultural Development Corporation.

I feel that the same considerations are valid as those stated in the letter from Marvin Galts and myself which was attached to the Windmill Dairy Co-op application. Basically the group is asking for an interest rate of 9% with debt retirement over twenty years and a three year deferral of principal and interest payments.

Economist

Glen Valley Dairy Co-op
Box 1114,
Glenwood, Alberta.
June 11, 1974.

Agricultural Development Corporation,
4910 - 52 Street,
Camrose, Alberta.

Dear Sirs:

We, the Glen Valley Dairy Co-op, dc hereby make application to the Agricultural Development Corporation for a loan of $2,103,000 to establish a 1,250 head co-op dairy herd. Investors will contribute $200,000 in equity and assume personal liability for $200,000 of the loan. The Board of Directors will be farm controlled with representation by professional and business investors.

The following is the objective of our group:

1. Stabilize the economy of the area.
2. Better utilize the irrigation in our area.
3. Provide milk for the U.I.D. Cheese Factory Co-op Ltd., which at the present time could process an additional 120,000 pounds of milk.
4. To provide secondary industry such as raising surplus calves, feed milk and personal housing.
5. Give small farmers in the area the opportunity to raise feed and increase their income potential.

Realizing this will be the largest dairy in Canada, we feel this enterprise will have an educational value to other dairymen in Alberta and Canada and to government staff, and the Co-op plans to accommodate observations of enterprise.

Due to the fact that this size of dairy operation is unprecedented in Canada, we expect initial high costs and request assistance from the provincial government with interest rates and terms of debt retirement as well as professional and consulting services.

We will attempt to contract feed from local producers at reasonable levels over next three years in order to minimize costs.

For any further information please contact me.

Your consideration of our application will be appreciated.

Yours truly,

President Glen Valley Dairy Co-op.

ALBERTA AGRICULTURAL DEVELOPMENT CORPORATION
4910 - 52 Street, Camrose; Phone: 672-3347

APPLICATION FOR GUARANTEED LOAN

Under the Alberta Agricultural Davelopment Corporation

---

1 NAME OF APPLICANT Glen Valley Dairy Co-op

FULL ADDRESS AND TELEPHONE Box 114, Glenwood. Phone: 626-3690

CORRESPONDENCE TO BE FOR THE ATTENTION OF (NAME AND POSITION) President

2. IDENTIFICATION OF APPLICANT'S BUSINESS

The co-op is made up of 43 farm and 25 non-farm investors. The farmers hold 64 shares while non-farm investors hold 43 shares. Co-op wishes to start a dairy herd operation in the Glenwood area.

3. LOAN APPLIED FOR - $2, 103,000 FOR TERM OF 20 YEAR(S)

4. PROPOSED METHOD OF REPAYMENT (BY INSTALMENTS).

Monthly ___ Quarterly ___ Semi-annually ___ Annually ___ OR (specify) xx Quarterly after 3 years.

5. APPLICATION OF FUNDS (attach separate sheet if necessary)

Proposed Application of Funds		Proposed Sources of Financing	
	$	Loan Applied for in Item 3	$
	$		$
	$		$
	$		$
TOTAL:	$	TOTAL:	$

See Attached Sheet

6. FORM OF ORGANIZATION

Incorporation ___ Partnership ___ Sole Proprietorship ___ Co-operative xx Other (describe)

7. OWNERSHIP STRUCTURE (attach separate sheet if necessary) - See Appendix V

---

8. NATURE OF BUSINESS - Products sold, services performed, etc.

Dairy co-op intends to produce industrial milk and perform all related activities

---

9. BRIEF HISTORY OF BUSINESS

The Glen Valley Dairy Co-op is a group of farmers and business men in the Glenwood area who wish to start a 1,250 head dairy.

The objectives of the group are:

(a) Diversify their farm operations.
(b) Provide stable markets for their farm products.
(c) Provide employment opportunities for members of their families.

The group felt that dairying was an excellent addition to their farming operations but each as an individual could not enter dairying on his own due to investment and labor requirements.

---

10. OUTLINE OF PROJECT TO BE FINANCED -- EXPLAIN FULLY THE BENEFITS TO THE BUSINESS OPERATION

The group plans to establish a 1,250 head dairy and perform all related activities. We feel the best way to do this is to buy young open heifers and raise them to first lactation at which time necessary milking facilities and confinement housing will be completed. Due to the lack of production and low levels of production expected for first years of venture, the group requests consideration in terms of financing.

---

11. SECURITY OFFERED OR AVAILABLE -- INDICATE NATURE AND ESTIMATED VALUE

100 shares are sold with each share worth $2,000 with investors signing a guarantee of liability equal to the value of shares purchased, giving $200,000 equity and $400,000 investors' liability.

---

12. QUALIFICATIONS FOR A LOAN -- INDICATE BELOW

(a) Member of the Alberta Veterinary Medical Assoc. ____
(b) Canadian Citizen xx
(c) Landed Immigrant ____

13. HAVE DETAILED PLANS BEEN SUBMITTED OF PROPOSED BUILDING? No
(Semi-controlled environment housing proposed)

14. IF A CORPORATION, IS IT UNDERSTOOD THAT IT MAY BE REQUIRED TO HAVE FINANCIAL STATEMENTS AND PERSONAL GUARANTEES FOR EACH PRINCIPAL OFFICER? Yes

15. IF PRIVATE BUSINESSMAN OR PARTNERSHIP, IS IT AGREED TO SUPPLY FINANCIAL STATEMENTS ON BUSINESS AND PERSONAL FINANCIAL N/A

16.

Land Area	Type of Equipment -- general description N/A Estimated Value
Building -- dimensions no.of storeys type of construction	
If rented -- name of landlord amount of rent term of lease	
If owned -- legal description estimated value encumbrances	Encumbrances -- (attach separate sheet if necessary)

17. EMPLOYMENT DATA
Last complete year (if applicable) and estimates for next two years

Period Ending	Number of Employees			Total Annual Payroll
	High	Low	Average	
Spring, 1976	7	3	5	$ 48,000
Spring, 1977	17	18	16	$131,200
Spring, 1978	17	18	16	$131,200

18. BALANCE SHEET
Before and After employment of funds applied for in Item 3

19. INCOME STATEMENT Review for the past two years (if applicable) and projection for the next 3 years with this loan	YEAR ENDING					
	19__	19__	19__	19__	19__	
Sales						
Less Cost of Sales						
Operation profit (or loss)						
Less Administration and General Expenses						
Net Profit (or loss) before Allowances						
Remarks (if any)						

20. OTHER FINANCIAL DATA

(a) Limit of operating credit available from bank $__________

(b) Limit of operating credit available from other sources (specify) $ Nil

(c) Security now held by sources (a) and (b) above

(d) Total of monthly payments on borrowed funds $ Nil

(e) Buarantees of debts of other parties None xx. If yes, explain.

(f) Litigation pending None xx. If yes, explain

21. FINANCIAL STATEMENTS
If an existing operation, statements are attached for the last three years:

Period Ended__________ Period Ended__________ Period Ended__________

22. AUTHORIZATION TO BANK

I/WE HEREBY AUTHORIZE THE (name and address of bank) __________ TO RELEASE ANY INFORMATION IN ITS POSSESSION WHICH THE ALBERTA AGRICULTURAL DEVELOPMENT CORPORATION MAY IN ITS DISCRETION REQUIRE IN CONNECTION WITH THIS APPLICATION.

Signature of Applicant(s) or Authorized Signing Officer(s)) ....
....

23. CERTIFICATE

I/WE HEREBY CERTIFY THAT THE INFORMATION CONTAINED HEREIN AND ATTACHED HERETO IS CORRECT. NO VITAL FACTS HAVE BEEN WITHHELD WHICH MAY ADVERSELY AFFECT THIS APPLICATION FOR ASSISTANCE OR ANY UNDERTAKING BASED UPON THIS APPLICATION.

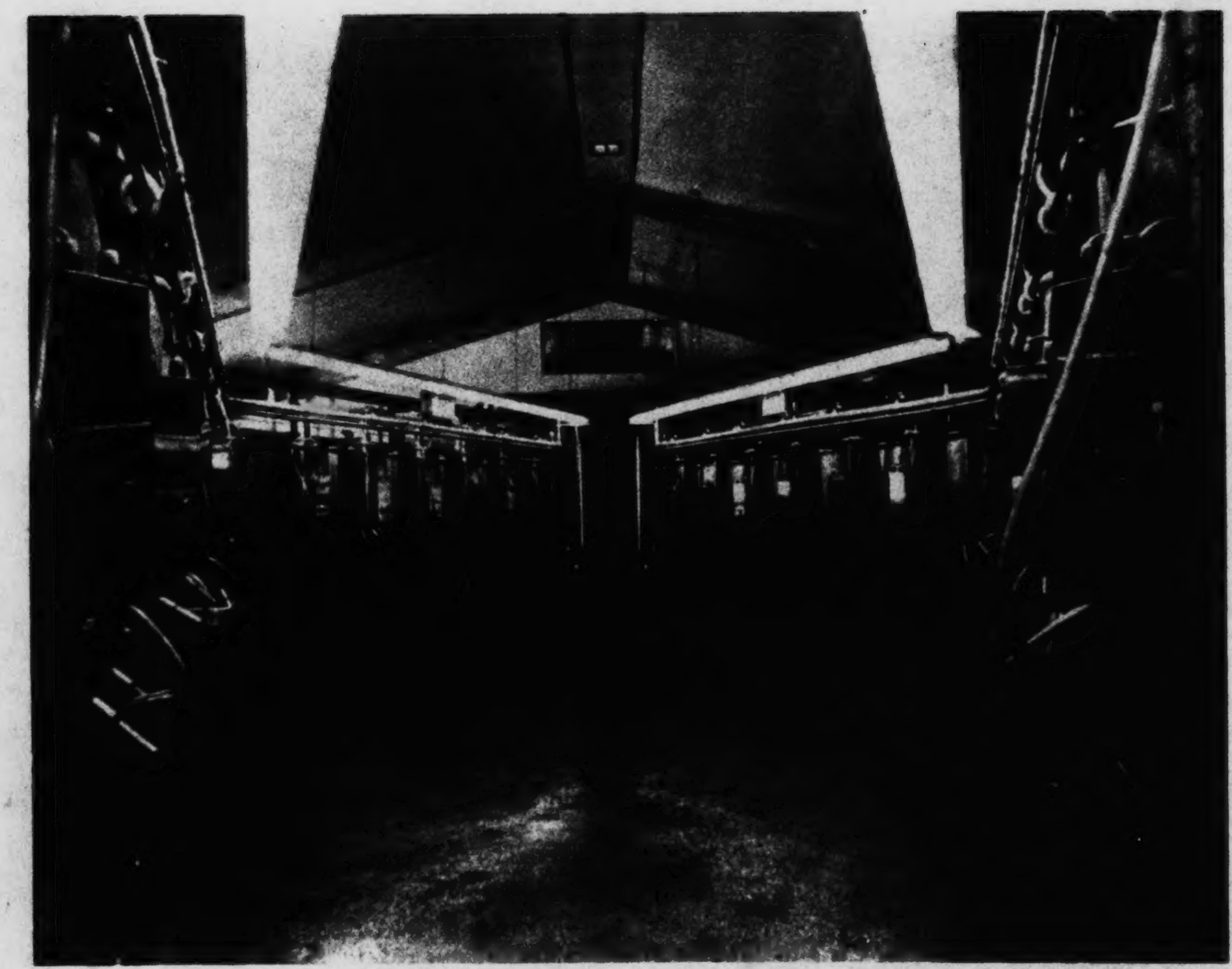
Signature of Appli-) ....
cant(s) or Authorized)
Signing Officer(s)) ....

APPENDIX X

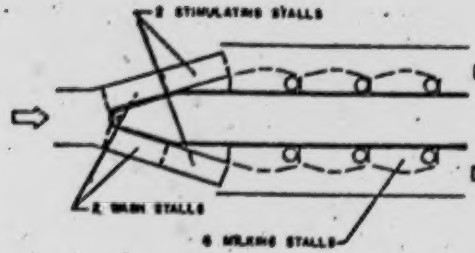
Included in Appendix X are plans and equipment, associated with the operations of large dairy cow complexes. It is not presumed that any or all of them will be useful as portrayed here. It is, however, suggested that adaptations of these plans may be helpful to groups establishing Cowdominiums in Alberta.

The following items are included:

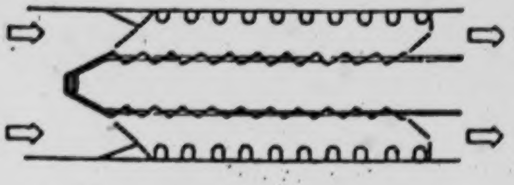
1. A 24-point "Polygon" milking parlor.
2. Herringbone, rotary and combination milking parlors.
3. Herringbone, rotary and combination milking parlors.
4. Mobile calf pen.
5. Free stall barn.
6. Free stall barn.
7. Free stall barn construction details.
8. A 1,000-cow dairy barn unit.
9. A 1,000-cow dairy barn unit.



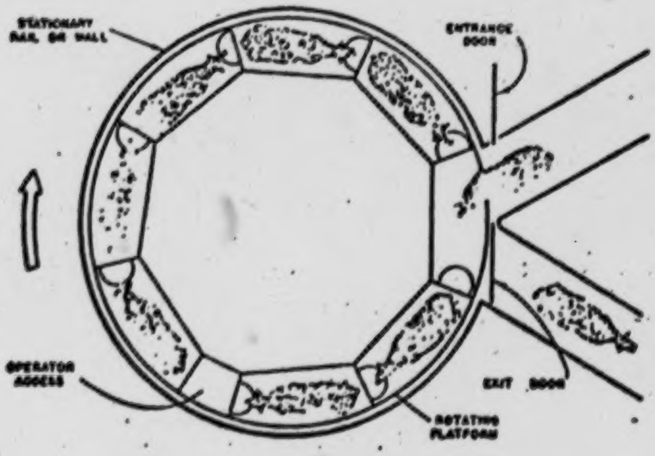
A 24-point "Polygon" milking parlor


2 STIMULATING STALLS
2 WASH STALLS
6 MILKING STALLS

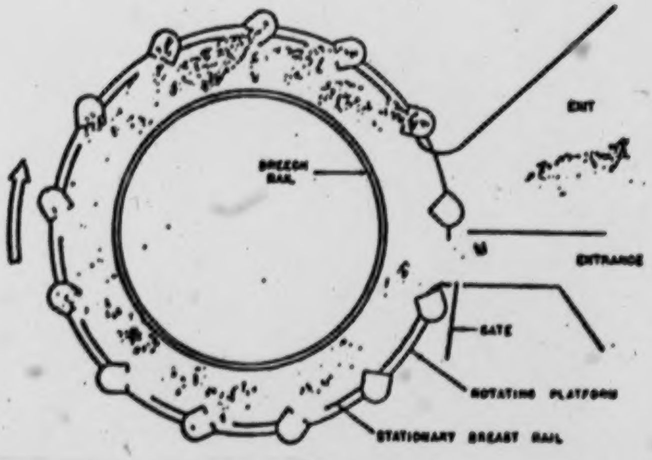
Side-opening type parlor



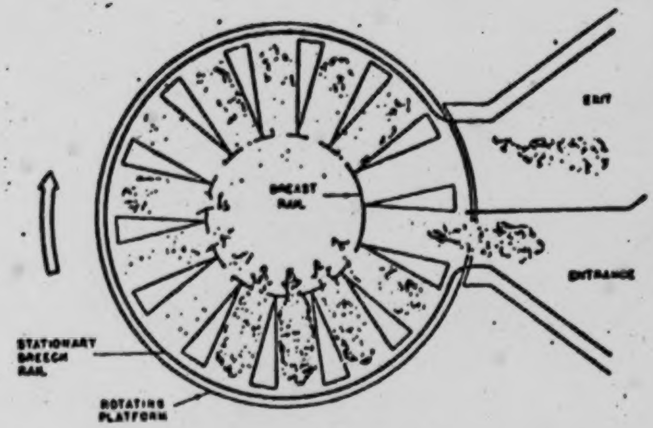
Herringbone type parlor
(double-10)


STATIONARY RAIL OR WALL
ENTRANCE DOOR
OPERATOR ACCESS
EXIT DOOR
ROTATING PLATFORM

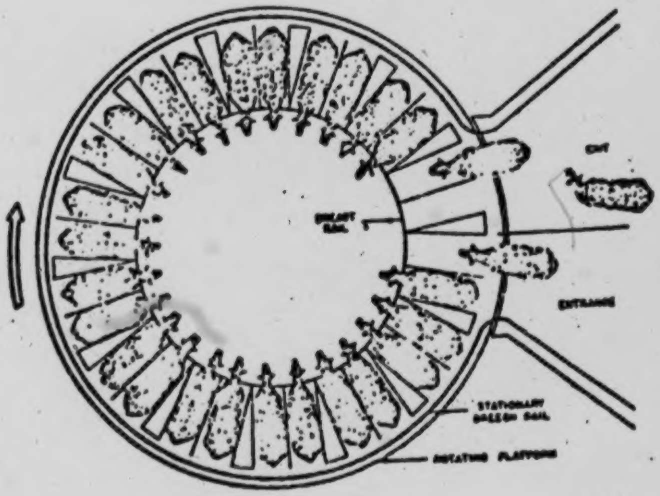
Rotary tandem parlor with eight stalls.


EXIT
BREECH RAIL
ENTRANCE
GATE
ROTATING PLATFORM
STATIONARY BREAST RAIL

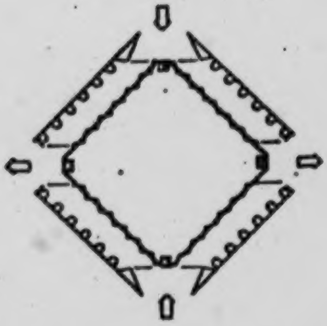
Rotary herringbone. Cow partitions or yokes not shown.


EXIT
BREAST RAIL
ENTRANCE
STATIONARY BREECH RAIL
ROTATING PLATFORM

Turnstyle parlor
with 14 stalls

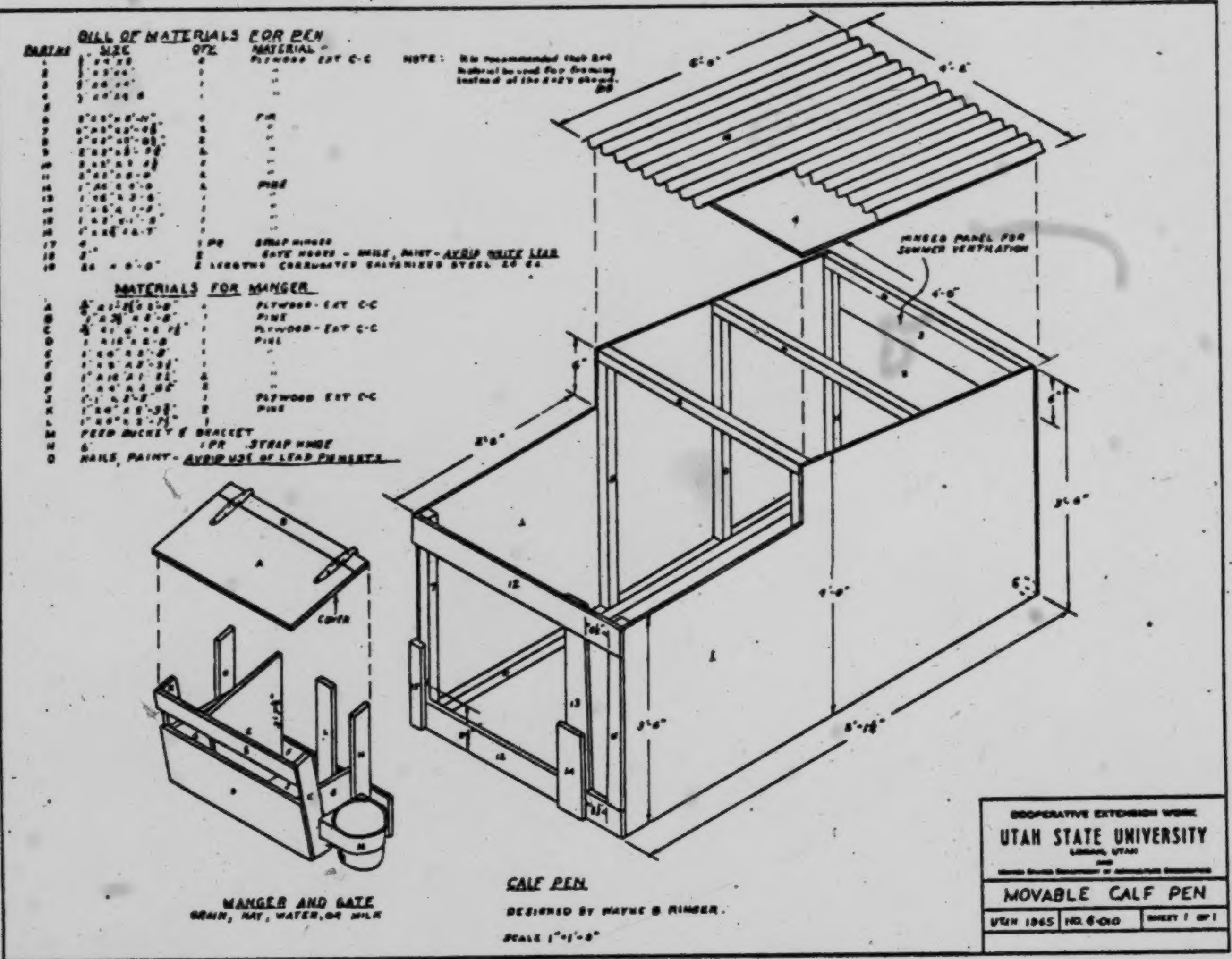

EXIT
BREAST RAIL
ENTRANCE
STATIONARY BREECH RAIL
ROTATING PLATFORM

A 28 stall turnstyle
with double-entry
and double-exit.



Michigan polygon parlor
(four sides with six cows per side)

One side of a double-6
herringbone with feedgates,
feed trough and positioning rails.


6'-0"
4'-6"
HINGED PANEL FOR SUMMER VENTILATION
4'-0"
6"
3'-6"
2'-6"
4'-0"
3'-0"
8'-1½"
CALF PEN
MANGER AND GATE
COVER

BILL OF MATERIALS FOR PEN

PART NO	SIZE	QTY	MATERIAL
1	[illegible]	[illegible]	PLYWOOD EXT C-C
2	[illegible]	1	"
3	[illegible]	1	"
4	[illegible]	1	"
5			
6	[illegible]	[illegible]	FIR
7	[illegible]	[illegible]	"
8	[illegible]	[illegible]	"
9	[illegible]	[illegible]	"
10	[illegible]	[illegible]	"
11	[illegible]	[illegible]	"
12	[illegible]	[illegible]	PINE
13	[illegible]	[illegible]	"
14	[illegible]	1	"
15	[illegible]	1	"
16	[illegible]	[illegible]	"
17	4"	1 PR	STRAP HINGES
18	3"	2	GATE HOOKS - NAILS, PAINT - AVOID WHITE LEAD
19	26" x 8'-0"	2	LENGTHS CORRUGATED GALVANIZED STEEL 26 GA

NOTE: It is recommended that 2x4 material be used for framing instead of the 2x2's shown.

MATERIALS FOR MANGER

PART NO	SIZE	QTY	MATERIAL
A	[illegible]	1	PLYWOOD - EXT C-C
B	[illegible]	1	PINE
C	[illegible]	1	PLYWOOD - EXT C-C
D	[illegible]	1	PINE
E	[illegible]	1	"
F	[illegible]	1	"
G	[illegible]	[illegible]	"
H	[illegible]	[illegible]	"
J	[illegible]	1	PLYWOOD EXT C-C
K	[illegible]	2	PINE
L	[illegible]	1	
M	FEED BUCKET & BRACKET		
N	6"	1 PR	STRAP HINGE
O	NAILS, PAINT - AVOID USE OF LEAD PIGMENTS		

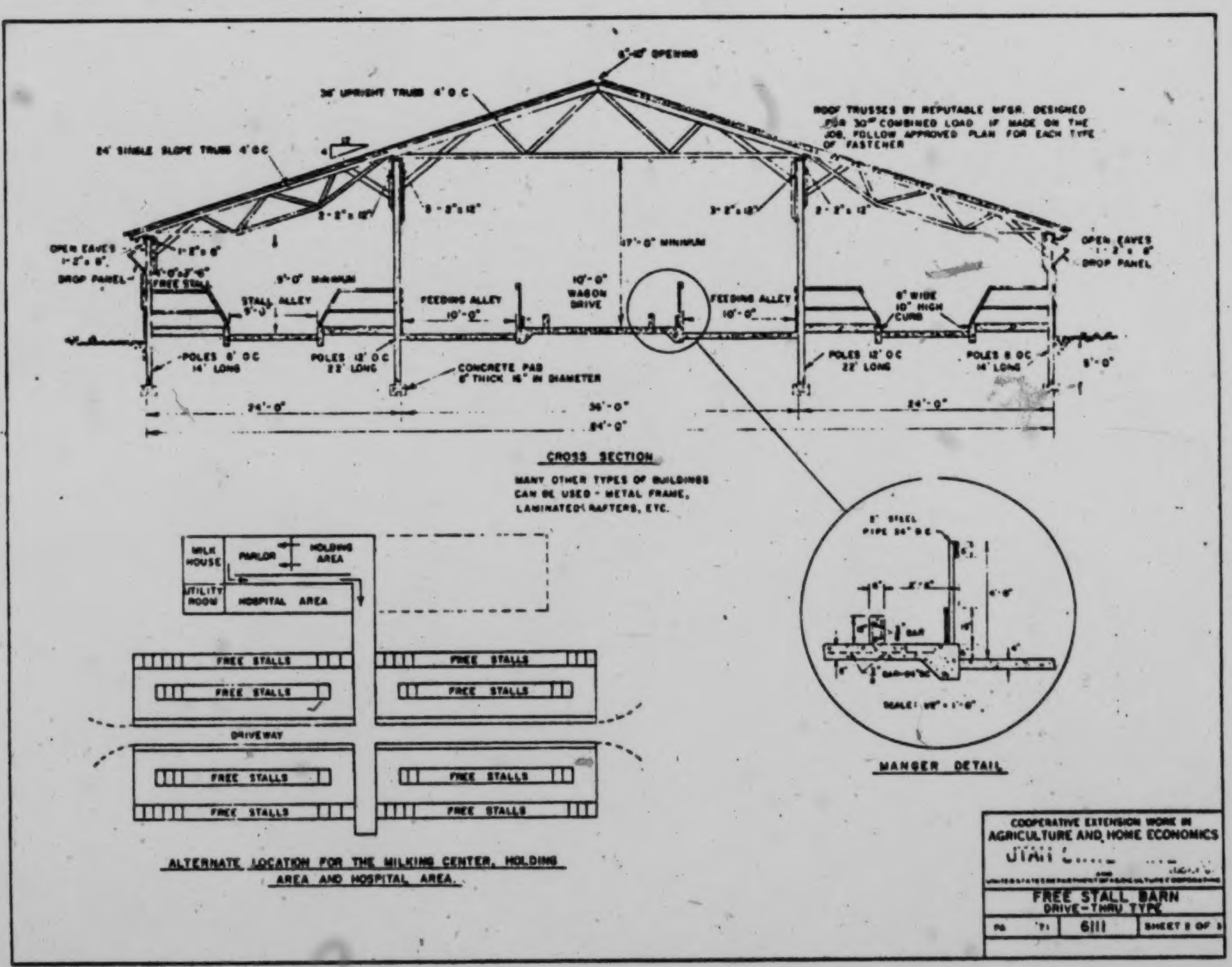
MANGER AND GATE
GRAIN, HAY, WATER, OR MILK

CALF PEN
DESIGNED BY WAYNE B RINGER.
SCALE 1"=1'-0"

COOPERATIVE EXTENSION WORK
UTAH STATE UNIVERSITY
LOGAN, UTAH
AND
UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

MOVABLE CALF PEN

UTAH 1965 | NO. 6-010 | SHEET 1 OF 1


6'-0" OPENING
36' UPRIGHT TRUSS 4' O C
24' SINGLE SLOPE TRUSS 4' O C
12
4
ROOF TRUSSES BY REPUTABLE MFGR. DESIGNED FOR 30# COMBINED LOAD. IF MADE ON THE JOB, FOLLOW APPROVED PLAN FOR EACH TYPE OF FASTENER
2 - 2" x 12"
3 - 2" x 12"
3 - 2" x 12"
2 - 2" x 12"
OPEN EAVES 1-2" x 8"
1-2" x 6"
DROP PANEL
4'-0" x 7'-6" FREE STALL
9'-0" MINIMUM
17'-0" MINIMUM
STALL ALLEY 9'-0"
FEEDING ALLEY 10'-0"
10'-0" WAGON DRIVE
FEEDING ALLEY 10'-0"
8" WIDE 10" HIGH CURB
OPEN EAVES 1-2" x 8"
DROP PANEL
POLES 8' O C 14' LONG
POLES 12' O C 22' LONG
CONCRETE PAD 8" THICK 16" IN DIAMETER
POLES 12' O C 22' LONG
POLES 8' O C 14' LONG
5'-0"
24'-0"
36'-0"
84'-0"
24'-0"
2" STEEL PIPE 24" O C
6'-0"
BAR
SCALE: 1/2" = 1'-0"
MILK HOUSE
PARLOR
HOLDING AREA
UTILITY ROOM
HOSPITAL AREA
FREE STALLS
FREE STALLS
FREE STALLS
FREE STALLS
DRIVEWAY
FREE STALLS
FREE STALLS
FREE STALLS
FREE STALLS

CROSS SECTION

MANY OTHER TYPES OF BUILDINGS CAN BE USED - METAL FRAME, LAMINATED RAFTERS, ETC.

MANGER DETAIL

ALTERNATE LOCATION FOR THE MILKING CENTER, HOLDING AREA AND HOSPITAL AREA.

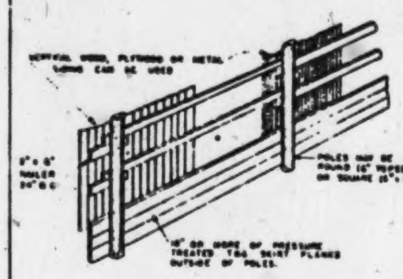
COOPERATIVE EXTENSION WORK IN
AGRICULTURE AND HOME ECONOMICS
UTAH

FREE STALL BARN
DRIVE-THRU TYPE

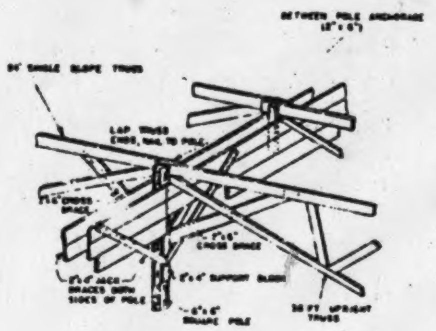
PG	'71	6111	SHEET 2 OF 3

SIDE WALL DETAIL

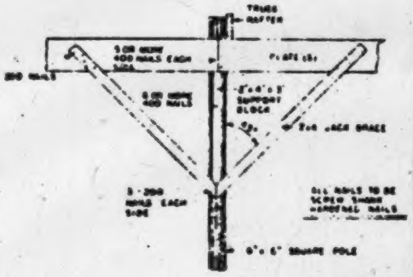
POLES MUST BE PRESSURE TREATED FOR 30 YEAR LIFE. UNTREATED OR COLD TREATED POLES WILL HAVE A SHORT LIFE. POLES MAY BE ROUND (6" TOPS) OR SQUARE (6" x 6").


VERTICAL WOOD, PLYWOOD OR METAL SIDING CAN BE USED
2" x 6" NAILER 24" O.C.
POLES MAY BE ROUND (6" TOPS) OR SQUARE (6" x 6")
18" OR MORE OF PRESSURE TREATED T&G SKIRT PLANKS OUTSIDE OF POLES.

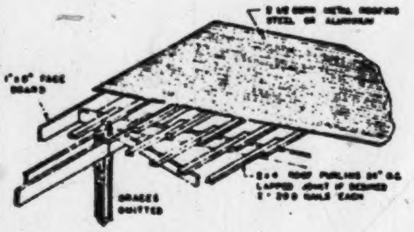
INTERIOR POLE BRACING AND RAFTER DETAIL


BETWEEN POLE ANCHORAGE (2" x 6")
36' SINGLE SLOPE TRUSS
LAP TRUSS ENDS, NAIL TO POLE
2"x 6" CROSS BRACE
2"x 6" CROSS BRACE
2"x 4" JACK BRACES BOTH SIDES OF POLE
2"x 4" SUPPORT BLOCK
6"x 6" SQUARE POLE
36 FT. UPRIGHT TRUSS

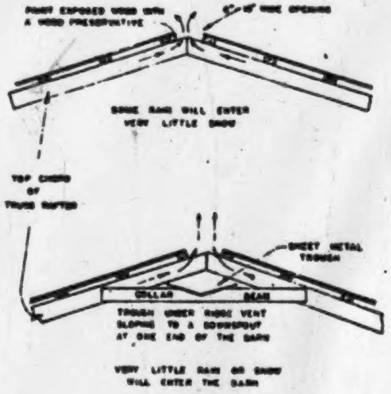
SIDEWALL POLE BRACING AND NAILING DETAIL


TRUSS RAFTER
5-20 NEW 40D NAILS EACH SIDE
PLATE (3)
20D NAILS
5-20 NEW 40D NAILS
2"x 4"x 3' SUPPORT BLOCK
45°
2x4 JACK BRACE
3-20D NAILS EACH SIDE
ALL NAILS TO BE SCREW SHANK HARDENED NAILS
6"x 6" SQUARE POLE

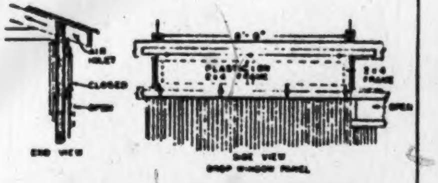
ROOFING DETAIL WITH PURLINS AND METAL ROOFING


2 1/2 GAUGE METAL ROOFING STEEL OR ALUMINUM
1"x 8" FACE BOARD
2x4 ROOF PURLINS 24" O.C. LAPPED JOINT IF DESIRED 2-20D NAILS EACH
BRACES OMITTED

OPEN RIDGE VENT DETAIL


PAINT EXPOSED WOOD WITH A WOOD PRESERVATIVE
6"-10" WIDE OPENING
SOME RAIN WILL ENTER VERY LITTLE SNOW
TOP CHORD OF TRUSS RAFTER
SHEET METAL TROUGH
COLLAR
BEAM
TROUGH UNDER RIDGE VENT SLOPING TO A DOWNSPOUT AT ONE END OF THE BARN
VERY LITTLE RAIN OR SNOW WILL ENTER THE BARN

PANEL WINDOW DETAIL

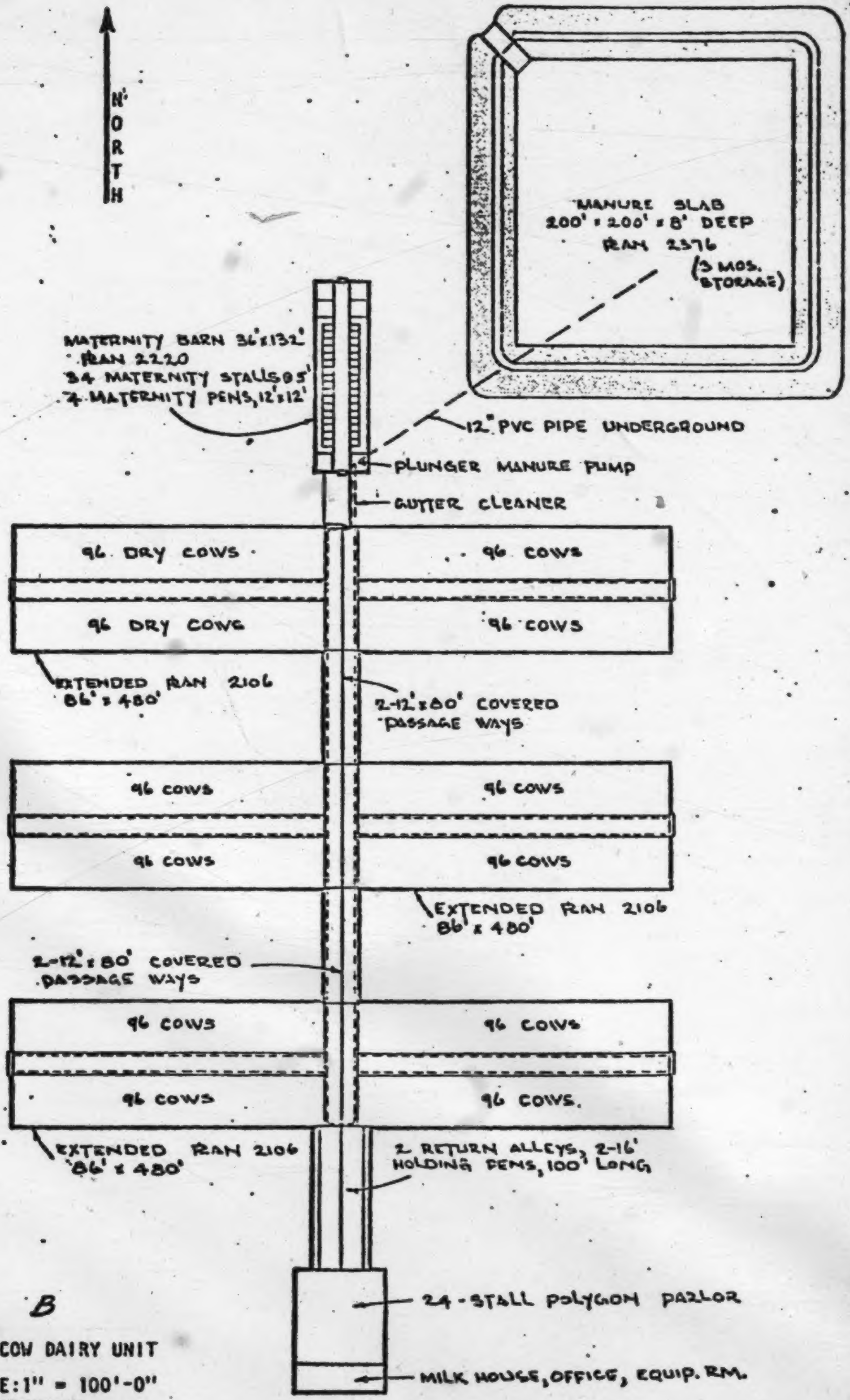

AIR INLET
CLOSED
OPEN
END VIEW
8'-0"
PLASTIC ON 2x4 FRAME
2x4 FRAME
OPEN
SIDE VIEW
DROP WINDOW PANEL

PANELS MAY BE HINGED EITHER AT THE BOTTOM OR TOP

COOPERATIVE EXTENSION WORK IN
AGRICULTURE AND HOME ECONOMICS
UTAH S[illegible]
AND
UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

FREE STALL BARN
DRIVE-THRU TYPE

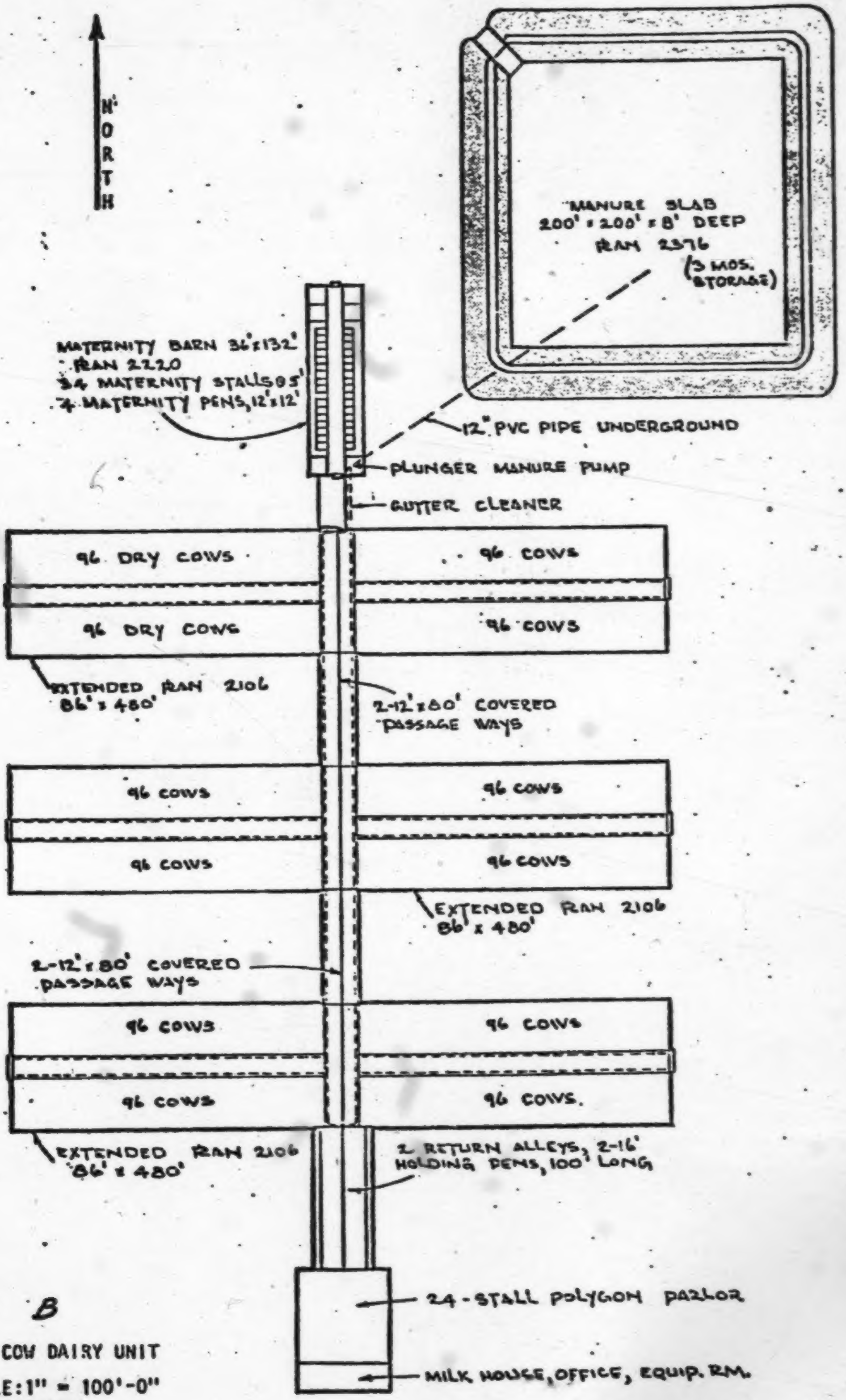
PA. '71	6111	SHEET 3 OF 3


NORTH
MANURE SLAB
200' x 200' x 8' DEEP
RAN 2376
(3 MOS. STORAGE)
MATERNITY BARN 36' x 132'
RAN 2220
34 MATERNITY STALLS @ 5'
7 MATERNITY PENS, 12' x 12'
12" PVC PIPE UNDERGROUND
PLUNGER MANURE PUMP
GUTTER CLEANER
96 DRY COWS
96 COWS
96 DRY COWS
96 COWS
EXTENDED RAN 2106
86' x 480'
2-12' x 80' COVERED PASSAGE WAYS
96 COWS
96 COWS
96 COWS
96 COWS
EXTENDED RAN 2106
86' x 480'
2-12' x 80' COVERED PASSAGE WAYS
96 COWS
96 COWS
96 COWS
96 COWS.
EXTENDED RAN 2106
86' x 480'
2 RETURN ALLEYS, 2-16' HOLDING PENS, 100' LONG
24-STALL POLYGON PARLOR
MILK HOUSE, OFFICE, EQUIP. RM.

B

1000 - COW DAIRY UNIT

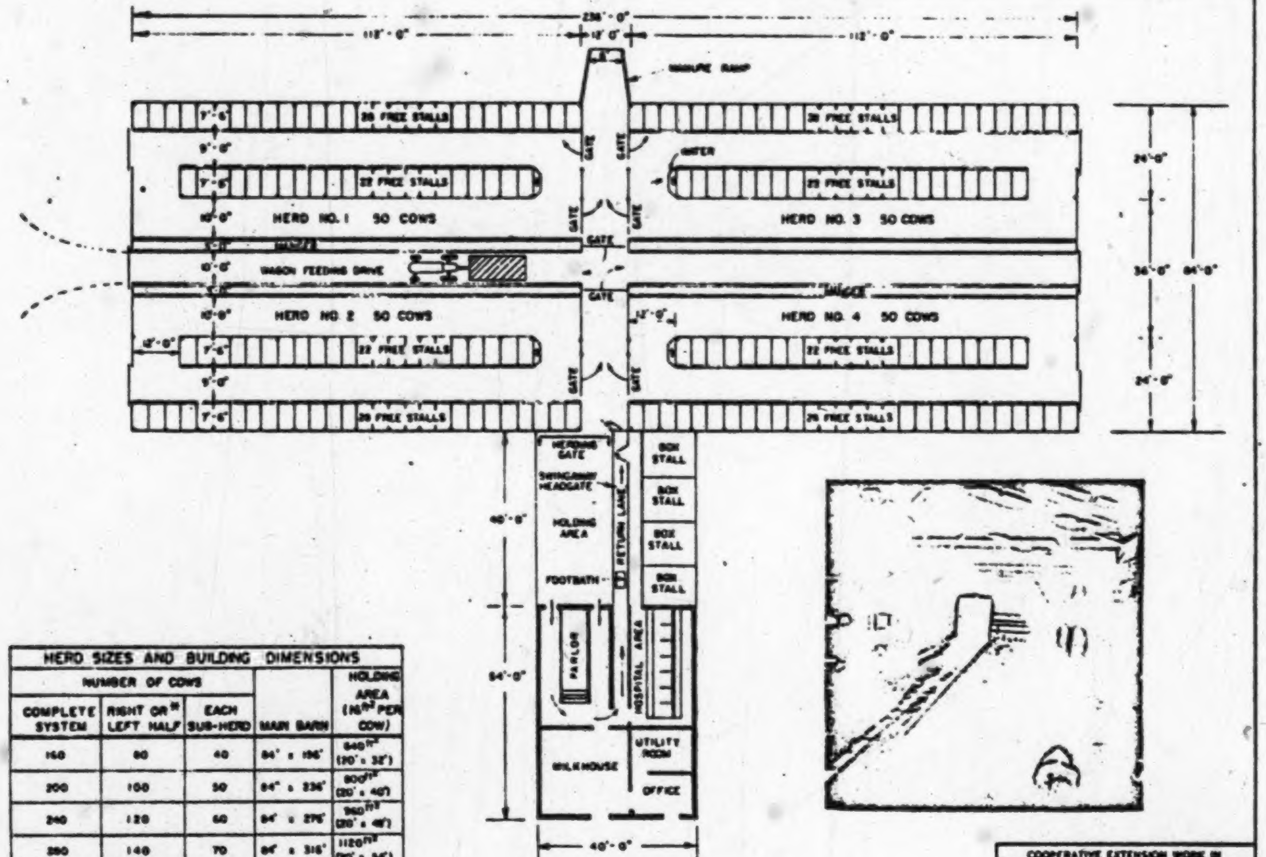
SCALE: 1" = 100'-0"
J.E. TURNBULL,
AGRICULTURE CANADA


NORTH
MANURE SLAB
200' x 200' x 8' DEEP
PLAN 2376
(3 MOS. STORAGE)
MATERNITY BARN 36' x 132'
PLAN 2220
34 MATERNITY STALLS @ 5'
4 MATERNITY PENS, 12' x 12'
12" PVC PIPE UNDERGROUND
PLUNGER MANURE PUMP
GUTTER CLEANER
96 DRY COWS
96 COWS
96 DRY COWS
96 COWS
EXTENDED PLAN 2106
86' x 480'
2-12' x 80' COVERED PASSAGE WAYS
96 COWS
96 COWS
96 COWS
96 COWS
EXTENDED PLAN 2106
86' x 480'
2-12' x 80' COVERED PASSAGE WAYS
96 COWS
96 COWS
96 COWS
96 COWS.
EXTENDED PLAN 2106
86' x 480'
2 RETURN ALLEYS, 2-16' HOLDING PENS, 100' LONG
24-STALL POLYGON PARLOR
MILK HOUSE, OFFICE, EQUIP. RM.

B

1000 - COW DAIRY UNIT

SCALE: 1" = 100'-0"
J.E. TURNBULL,
AGRICULTURE CANADA


236'-0"
112'-0"
12'-0"
112'-0"
MANURE RAMP
28 FREE STALLS
28 FREE STALLS
22 FREE STALLS
22 FREE STALLS
22 FREE STALLS
22 FREE STALLS
28 FREE STALLS
28 FREE STALLS
WATER
GATE
HERD NO. 1 50 COWS
HERD NO. 2 50 COWS
HERD NO. 3 50 COWS
HERD NO. 4 50 COWS
WAGON FEEDING DRIVE
7'-6"
9'-0"
10'-0"
12'-0"
24'-0"
36'-0"
84'-0"
HERDING GATE
SWINGAWAY HEADGATE
HOLDING AREA
FOOTBATH
PARLOR
RETURN LANE
HOSPITAL AREA
BOX STALL
UTILITY ROOM
MILKHOUSE
OFFICE
40'-0"
84'-0"

FLOOR PLAN

SCALE: 1/16" = 1'-0"

HERD SIZES AND BUILDING DIMENSIONS

NUMBER OF COWS			MAIN BARN	HOLDING AREA (16 ft² PER COW)
COMPLETE SYSTEM	RIGHT OR* LEFT HALF	EACH SUB-HERD		
160	80	40	84' × 196'	640 ft² (20' × 32')
200	100	50	84' × 236'	800 ft² (20' × 40')
240	120	60	84' × 276'	960 ft² (20' × 48')
280	140	70	84' × 316'	1120 ft² (20' × 56')
320	160	80	84' × 356'	1280 ft² (20' × 64')

*BUILD EITHER THE RIGHT OR LEFT HALF OF THE FREE STALL BARN AND DIVIDE THE HERD INTO TWO GROUPS

PENNSYLVANIA STATE UNIVERSITY NO. 723-339

COOPERATIVE EXTENSION WORK IN
AGRICULTURE AND HOME ECONOMICS
UTAH [illegible]

FREE STALL BARN
DRIVE-THRU TYPE

PA. '71	6111	SHEET 1 OF 1